CITY OF ABERDEEN.

Report

BY THE

MEDICAL OFFICER OF HEALTH

FOR THE YEAR

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POPULATION.

(Table I.)

Estimated from the census of 1901 and the previous census of 1891, the population of the city, at the middle of 1904, was 164,124, whereof 65,696 persons were in the St. Nicholas division, including Torry; and the remainder—98,428—were in the St. Machar division, including Old Aberdeen and Woodside. The population of the city in the preceding year was similarly estimated at 160,780. The increase, according to these estimates, amounts, therefore, to 3,344. In previous years I have found it more reliable to calculate the increase from the voters' roll, and on this basis I estimate the population of Aberdeen to have been 163,483, or slightly less than figure of the Registrar-General. The increase in the voters' roll last year was considerably under the increase in the preceding year, showing that the recent rapid extension of the city had received a considerable check.

BIRTH-RATE.

(Table II.)

The number of births during the year was 4,885. After a slight rise in the preceding year, the birth-rate fell last year to 29·8 per 1,000 of the population—the lowest point reached since civil registration began nearly fifty years ago. The fall was shared by both the St. Nicholas and the St. Machar divisions of the city, the rate in each being the lowest on record.

The fall in the birth-rate is the more noteworthy, inasmuch as the marriage-rate has been increasing during the past three years.

The average birth-rate in the city thirty to forty years ago was 36·2 per 1,000 of the population. The rate of the past year, accordingly, represents a fall of 6·4 per 1,000 of population. In other words, had the birth-rate been maintained at its old level, there would have been last year about 1,050 more births in the city than actually took place. Fortunately, the reduction in the death-rate has thus far been keeping almost equal pace with the fall in the birth-rate, so that the surplus of births over deaths, in proportion to the population, is not materially less than it formerly was.

MARRIAGE-RATE.

(Table II.)

I have remarked in previous reports that an increasing marriage-rate is usually regarded as a sign of increasing industrial prosperity. If this relationship is true, in spite of the diminished rate of growth of the population during the past year, it is satisfactory to observe that the marriage rate has been steadily increasing during the past three years, having risen from 8·9 per 1000 in the year 1901, to 9·1 in 1902 and 1903, and to 9·2 in 1904.

Table I.—Population of Aberdeen in 1904.

	Estimated Population. — 1904	Per-centage of Population at each Age-Period, Calculated from Census, 1891.					
		Under 1 year.	0—5. years.	5—15 years.	15—25 years.	25—60 years.	Above 60 years.
St. Nicholas and Torry .	65,696	2·95	13·37	23·54	20·10	35·76	7·23
St. Machar . . . . (Incl. Woodside and Old Aberdeen).	98,428	2·46	11·46	22·23	21·65	35·86	8·80
Whole City . . .	164,124	2·67	12·26	22·79	21·00	35·81	8·14

Table II.—Birth, Death, and Marriage Rates in Aberdeen, Per 1,000 of Population.

Year.	Births.			Deaths.			Marriages.		
	St. Nicholas.	St. Machar.	City.	St. Nicholas.	St. Machar.	City.	St. Nicholas.	St. Machar.	City.
1904	34·2	26·8	29·8	20·6	15·0	17·2	14·0	5·9	9·2
1903	35·9	27·7	31·0	21·1	14·4	17·0	14·2	5·6	9·1
1902	35·4	27·2	30·5	22·1	15·1	17·9	14·1	5·7	9·1
1901	37·0	27·0	31·0	21·6	16·0	18·2	13·3	5·9	8·9
1900	37·8	27·9	31·9	23·7	15·9	19·0	14·0	5·6	9·0
1899	38·0	27·7	31·9	22·6	15·5	18·4	13·9	6·7	9·6
Mean of 1899-1903	36·8	27·5	31·3	22·2	15·4	18·1	13·9	5·9	9·1
1898	38·2	27·9	32·1	23·5	15·0	18·5	14·5	5·9	9·4
1897	37·6	28·0	31·9	21·8	14·3	17·4	13·8	6·0	9·2
1896	36·6	28·6	31·9	22·1	14·7	17·8	13·9	6·3	9·5
1895	38·2	27·7	32·1	25·5	17 2	20·7	13·4	5·5	8·8
1894	35·2	28·1	31·1	22·1	15·6	18·4	12·6	5·9	8·8
Mean of 1894-98	37·2	28·1	31·8	23·0	15·4	18·6	13·6	5·9	9·1
Mean of 1886-95	35·4	29·5	32·0	22·7	17·4	20·0	11·1	5·7	8·1
1876-85	...	...	34·3	...	...	20·4	...	...	7·8
1866-75	...	...	36·2	...	...	23·0	...	...	8·2

The marriage-rate was as usual very much higher in the St. Nicholas division than in the St. Machar division of the city, but this is largely due to a large number of marriages taking place in halls and churches, which are more numerous in the former than in the latter division.

DEATH-RATE.

(Table II.)

The deaths during the year amounted to 2,826, equal to a death-rate of 17·2 per 1,000 of the population. This is a slightly higher mortality than in the preceding year, when the rate was 17·0, or the lowest on record since civil registration commenced. The rate for the past year is, however, the second lowest. These are low rates for a town of the size of Aberdeen, and compare favourably with the rates in other large towns, although there is reason to hope that the rate has not yet reached the irreducible minimum. The higher mortality of the past year, as compared with that of the preceding year, is wholly to be explained by the greater mortality from the commoner zymotic diseases, owing especially to the high prevalence of whooping cough, and the continuance of the epidemic of measles which had begun in the later months of the preceding year. If the death-rate last year had reached the average level of the death-rate in the city thirty to forty years ago, the number of deaths would have been 3,775, or 949 more than the number of deaths that actually occurred.

Analysis of the Death-Rate.

(*a*) *Mortality in relation to Age (Tables III., IV., and V.).*—It is somewhat disappointing to note that the mortality rate among children *under one year of age* went up to 167·2 per 1,000 during the past year, after falling to 156·5 and 157·2 in the preceding two years. It is, however, lower than the average rate for the past twenty years, although higher than the average rate in the earlier years of registration. The high rate is partly to be attributed to the great prevalence of measles and whooping cough—two diseases which, when epidemic, freely attack infants, and are always attended by an exceptionally high case-mortality in the first and second years of life.

I have, in previous years, enlarged upon the absence of a reduction in the mortality among infants, while the mortality at practically every other age has been exhibiting a more or less pronounced decrease within recent years. It offers some measure of consolation to know that this is almost the universal experience throughout the United Kingdom. There can be no doubt that one important cause lies in the unsatisfactory feeding of infants, and especially in the increasing tendency to substitute cow's milk for the mother's breast. Cow's milk even when pure and properly treated is an indifferent substitute for the milk of the mother, but it is practically impossible, even when considerable care is exercised, to contrive to supply it to the child free from germ impurity. It has often to be conveyed a long distance and by several hands, and has to pass through many vessels before it eventually reaches the mouth of the infant, and is thus exposed at numerous points to contamination. Where mothers are compelled by circumstances of health to feed their infants on cow's milk they should take great pains to secure that the risks of contamination are diminished as far as possible—firstly, by procuring the milk direct from the dairy farmer ; secondly, by satisfying themselves of the scrupulous cleanliness of the farmer in the management of his dairy ; thirdly, by requesting the farmer to place the supply, required for the infant, directly into a small and special can in which it should be delivered at the mother's house, and by making sure that the can is thoroughly cleaned and scalded after each use ; and fourthly, by being equally scrupulous and thorough as to the cleanliness of the bottle and tube used for feeding the infant. Every fresh

Table III.—Deaths at Various Age-Periods from Various Causes.

Year 1904.

Age.	All Causes.	Zymotic Diseases.				Tubercular Diseases.		Diseases of					Malignant Diseases.	Developmental Diseases (ex. old age)	Accident and Violence.	Debility, Atrophy, Inanition.		Miscellaneous.
		Miasmatic.	Diarrhœal.	Venereal.	Septic.	Phthisis.	Other Tubercular.	Respiratory System.	Circulatory System.	Urinary System.	Nervous System.	Digestive System.				Under age of 1 year.	Above age of 60 years.	
Whole City.																		
Under 1 year,	733	96	77	8	2	1	33	131	6	3	69	46	0	169	8	62	...	22
Under 5 years,	1100	265	97	8	3	6	82	198	6	4	100	52	0	169	15	62	...	33
5—15 ,,	112	13	2	0	3	17	20	11	11	4	5	9	1	...	8	...	...	8
15—25 ,,	119	4	0	1	1	46	6	13	12	2	6	10	0	...	6	...	...	12
25—60 ,,	654	15	2	0	15	115	13	85	105	27	71	36	72	...	50	...	...	48
60+ ,,	841	8	8	0	7	13	2	160	201	44	109	48	90	...	27	...	88	36
All Ages,	2826	305	109	9	29	197	123	467	335	81	291	155	163	169	106	...	...	137
St. Nicholas (including Torry).																		
Under 1 year,	400	34	53	4	1	0	18	75	2	3	30	23	0	99	6	37	...	15
Under 5 years,	612	126	66	4	2	3	44	116	2	3	49	27	0	99	11	37	...	23
5—15 ,,	69	6	0	0	3	12	14	9	8	3	0	6	1	...	6	...	...	1
15—25 ,,	66	4	0	1	1	23	2	8	6	1	4	6	0	...	4	...	...	6
25—60 ,,	313	7	1	0	10	49	3	36	52	11	27	16	37	...	41	...	...	23
60+ ,,	290	4	3	0	4	3	0	56	70	14	31	19	38	...	10	...	25	13
All Ages,	1350	147	70	5	20	90	63	225	138	32	111	74	76	99	72	...	...	66
St. Machar (including Old Aberdeen and Woodside).																		
Under 1 year,	333	62	24	4	1	1	15	56	4	0	39	23	0	70	2	25	...	7
Under 5 years,	488	139	31	4	1	3	38	82	4	1	51	25	0	70	4	25	...	10
5—15 ,,	43	7	2	0	0	5	6	2	3	1	5	3	0	...	2	...	...	7
15—25 ,,	53	0	0	0	0	23	4	5	6	1	2	4	0	...	2	...	...	6
25—60 ,,	341	8	1	0	5	66	10	49	53	16	44	20	35	...	9	...	...	25
60+ ,,	551	4	5	0	3	10	2	104	131	30	78	29	52	...	17	...	63	23
All Ages,	1476	158	39	4	9	107	60	242	197	49	180	81	87	70	34	...	...	71

TABLE IV.—DEATH RATES AT VARIOUS AGE-PERIODS FROM VARIOUS CAUSES (per 100,000 of population at each age.)—*Year* 1904.

Age.	All Causes.	Zymotic Diseases.				Tubercular Diseases.		Diseases of						Malignant Diseases.	Developmental Diseases (ex. old age)	Accident and Violence.	Debility, Atrophy, Inanition.		Miscellaneous.
		Miasmatic.	Diarrhoeal.	Venereal.	Septic.	Phthisis.	Other Tubercular.	Respiratory System.	Circulatory System.	Urinary System.	Nervous System.	Digestive System.					Under age of 1 year.	Above age of 60 years.	
WHOLE CITY.																			
Under 1 year,	16728	2191	1757	183	46	23	753	2989	137	68	1575	1050	0	3857	183	1415	...		502
Under 5 years,	5467	1317	482	40	15	30	408	984	30	20	497	258	0	840	75	...	...		164
5—15 ,,	299	35	5	0	8	45	53	29	29	11	13	24	3	0	21	...	...		21
15—25 ,,	345	12	0	3	3	133	17	38	35	6	17	29	0	0	17	...	...		35
25—60 ,,	1113	26	3	0	26	196	22	145	179	46	121	61	123	0	85	...	...		82
60+ ,,	6295	60	60	0	52	97	15	1198	1504	329	816	359	674	0	202	...	659		269
ALL AGES, .	1722	186	66	5	18	120	75	285	204	49	177	94	99	103	65	...	...		83
ST. NICHOLAS (including Torry).																			
Under 1 year,	20523	1745	2719	205	51	0	924	3848	103	154	1539	1180	0	5080	308	1898	...		770
Under 5 years,	6968	1435	752	46	23	34	501	1321	23	34	558	308	0	1128	125	...	..		262
5—15 ,,	446	39	0	0	19	78	90	58	52	19	0	39	6	0	39	...	...		6
15—25 ,,	500	30	0	8	8	174	15	61	45	8	30	45	0	0	30	...	...		45
25—60 ,,	1332	30	4	0	43	209	13	153	221	47	115	68	157	0	174	...	...		98
60+ ,,	6105	84	63	0	84	63	0	1179	1474	295	653	400	800	0	211	...	526		274
ALL AGES, .	2055	224	107	8	30	137	96	342	210	49	169	113	116	151	110	...	...		100
ST. MACHAR (including Old Aberdeen and Woodside).																			
Under 1 year,	13687	2548	986	164	41	41	617	2302	164	0	1603	945	0	2877	82	1028	...		288
Under 5 years,	4326	1232	275	35	9	27	337	727	35	9	452	222	0	621	35	...	...		89
5—15 ,,	197	32	9	0	0	23	27	9	14	5	23	14	0	0	9	...	...		32
15—25 ,,	249	0	0	0	0	108	19	23	28	5	9	19	0	0	9	...	...		28
25—60 ,,	966	23	3	0	14	187	28	139	150	45	125	57	99	0	25	...	...		71
60+ ,,	6361	46	58	0	35	115	23	1200	1512	346	900	335	600	0	196	...	727		265
ALL AGES, .	1500	161	40	4	9	109	61	246	200	50	183	82	88	71	35	...	...		72

TABLE V.—MORTALITY FROM ALL CAUSES AT VARIOUS AGE-PERIODS
(per 1,000 of population at each age.)

Year.	Age Period.						All ages.
	Under 1 year.	0—5 years. (Infant Period.)	5—15 years. (School Period.)	15—25 years. (Adolescent Period.)	25—60 years. (Mature Period.)	60 years and upwards. (Post-mature Period.)	
1904 . .	167·2	54·7	3·0	3·5	11·1	62·9	17·2
1903 . .	157·2	49·7	2·8	4·6	11·8	62·7	17·0
1902 . .	156·5	48·4	2·8	5·2	12·8	69·4	17·9
1901 . .	176·5	52·2	3·4	5·1	12·4	68·3	18·2
1900 . .	177·8	54·4	3·0	4·9	14·0	68·9	19·0
1899 . .	170·0	54·8	3·0	5·6	12·5	64·6	18·4
Mean of 1899-1903	167·6	51·9	3·0	5·1	12·7	66·8	18·1
1898 . .	189·5	60·6	3·6	4·6	11·6	61·7	18·5
1897 . .	168·6	51·0	3·2	5·3	11·4	62·6	17·4
1896 . .	153·4	51·0	4·5	5·0	12·6	60·8	17·8
1895 . .	201·4	62·4	4·5	5·9	12·5	67·2	20·7
1894 . .	173·4	51·9	4·5	6·2	11·4	59·7	18·4
Mean of 1894-98	177·3	55·4	4·1	5·4	11·9	62·4	18·6
Mean of 1886-95	168·5	53·8	4·6	6·3	12·8	68·1	20·0
1876-85 . .	144·9	52·0	5·7	6·9	13·5	69·9	20·4
1866-75 . .	146·2	59·4	7·4	6·0	18·7	72·3	23·0

supply of milk for the infant should be placed in a freshly-cleaned bottle, and the infant should never have supplied to it any milk that is sour or stringy or gives the slightest indication by taste or odour of having undergone change. Where mothers have not the means of satisfying themselves of the cleanliness of the dairy from which they obtain the milk supply, it would be wise to heat the milk to near the boiling point before using it. The heat will destroy all the dangerous germs that may be in the milk, but it will not render milk wholesome which is already obviously soured or decomposing.

If all mothers would exercise such precautions in the feeding of their infants, we could safely count upon a great reduction of infantile mortality. In several towns, the municipality has undertaken the responsibility of providing, at a reasonable price, heated or sterilised milk for infant feeding to all who may wish it, and it is interesting to note that, according to the published statistics, the mortality among children fed upon such milk is much lower than among children supplied with unsterilised cow's milk. The value of this arrangement is now so well attested that the time has probably come when the Town Council of Aberdeen might consider the propriety of establishing a depôt for sterilising and preparing milk for infant feeding, or of arranging with one or more of the larger dairy companies for the supply of such a milk. Meanwhile, efforts are being made by the Public Health Department to secure that the utmost care and cleanliness will be practised by dairymen. Our chief difficulty in these efforts is due to the bulk of the dairy farms lying outside the boundaries of the City, and being thus beyond the effective control of the City authorities. But even were all the dairy farms under the direct control of the City, we should still have largely to trust, for a steady maintenance of scrupulous cleanliness in the treatment of the milk, to an increasing sense of responsibility among the farmers and their servants. Such a sense is well exhibited, I am glad to say, in many cases, but in others there is still much room for improvement.

It ought, no doubt, to be always kept in mind that the consumer has it in his own power to demand whatever, within reason, he may require, provided he is willing to pay for it. And it is here that part of the difficulty lies in the supply of a pure milk. Many farmers are willing to undertake every precaution that may be suggested to them provided that they could feel sure that the cost of such precautions would be readily recovered in an increased price for the milk. The responsibility rests with the consumer to give adequate encouragement to the dairyman. This, in turn, depends on the public being sufficiently informed as to the great susceptibility of milk to contamination, and as to the precautions which ought to be practised both by themselves and by dairymen. To assist in disseminating such information, the Local Authority might be justified in incurring the expense of circulating in the City a Memorandum on the subject.

In this connection it may be mentioned that in some towns in America, where in matters of practical hygiene much pioneer work is being done, arrangements have been made by a public committee for the supply, to those who wish it, of what is called "medically certified" milk. The milk is, of course, sold at a higher price than ordinary milk, but there is a growing demand for it among the more enlightened citizens. The milk is not sterilised or treated in any way, but every possible effort is made to secure its purity from the moment it comes from the cow till its delivery to the consumer. As an illustration of the nature of the precautions taken by such a committee in New York, each cow is said, before milking, to be led singly from the byre to the washing and cleaning shed, where the udder and adjacent parts are washed with sponges and brushes dipped in antiseptic fluid, and are dried with sterilised towels. After being thus cleaned, the cow is led to the milking shed, where it is milked by milkers who are under regular medical supervision, and

who are required to wash themselves thoroughly in a bath-room provided for the purpose, and to wear clean linen clothes that have to be changed twice daily. The result is that while ordinary milk as supplied in New York contains 5,000,000 germs in each cubic centimetre, the medically-certified milk contains only about 1,500 to 1,600.

The mortality at the "*school*" *age-period* (5-15 years) was slightly higher than in each of the preceding two years, but was distinctly below the average for the preceding ten years. It is a very gratifying feature in the health statistics of the city, that the mortality among school children, regarding whose health condition in the country generally so much is being said at present, shows a greater proportional reduction than the mortality at any other age period. The rate last year was only 3·0 per 1,000, as against an average annual rate of 7·4 thirty years ago. During these years, every successive decade has witnessed a fall, so that we may regard the present low rate as a real gain, and likely to be maintained, unless there is a distinct retrogression in the conditions of living. This fact, especially when taken along with the fact that the mortality rate at the next age-period, the "adolescent" period of 15-25 years, also exhibits a great and steady decline in recent years, would appear to show that, at any rate, so far as this city is concerned, there is none of the physical deterioration which many fear is sapping the strength of the country. At the same time, it would ill become me to say that even in Aberdeen still better results may not be attainable, by a still closer attention to the physical requirements of the young.

I am in complete agreement with those who desire the systematic medical inspection of schools, believing that considerable advantage would result to many of the children, though the effects might not be reflected in any appreciable reduction of the death-rate. Very many school children, for example, suffer great discomfort from undetected defects of eye-sight, which may be the source of obscure headaches, and which may materially hinder the educational progress of the child. Others again may have the reputation with their teachers of being dull and stupid, when they are simply handicapped by an unnoticed deafness, which, if known, would secure for them a more suitable place in the class-room. In other cases, children are allowed to continue at school with infectious skin diseases, which, under proper medical supervision, would be detected, and the children excluded until the medical inspector was satisfied that the child had recovered, or the disease was being so treated as to prevent the child infecting others.

I am glad to report that the Aberdeen School Board was last year giving the subject of the medical inspection of school children its anxious consideration, and was good enough to ask me to confer with a committee of the Board. At the request of the committee I submitted suggestions of a scheme for the medical inspection of the schools under the Board. A copy of these suggestions appears in the appendix to this report (Appendix A). I believe that the chief difficulty in preventing the Board instituting this or some similar scheme is the financial one. The Board was, I believe, hopeful that some financial provision might be made for this purpose under the Education Bill. I am sorry that the Board has not yet seen its way to proceed with such a scheme, for, I think, the total cost of it, say £1,000 a year, would be well-spent money. In many of the leading continental towns, and in most of the large American towns, a system of medical inspection of schools has been in force for several years—in some cases for many years, and the health and educational authorities all testify to its advantages. In this country it is unfortunately true that very little has as yet been done, but the London School Board has for a long time had a medical staff, and has recently greatly augmented it; and a few other English towns have arranged, or are in course of arranging, for the medical inspection of their schools.

I confess I would feel gratified were Aberdeen to lead the way in Scotland. There are few places, if any, in this country where so much wisdom and enlightenment have been shown by the authorities in providing for the education of the children. From a hygienic standpoint no town within my knowledge is so admirably equipped with school buildings. The schools may appear to some to be almost palatial, but, as the responsible health officer of the city, I would not have them with a foot less of air space within, or a yard less of play-ground area without. It would tend to complete this admirable provision for the young, if the Board could see its way, with the support of the community, to undertake the medical or physical inspection of the children, so that the care of the body might, as is proper and necessary, be closely associated with the education of the mind.

Passing to the mortality rate at the "*adolescent*" *age period* (15-25 years) it will be noted that last year it was only 3·5 per 1,000 living at that age, or distinctly the lowest ever recorded, and scarcely more than a half of the rate prevalent a few years ago. It is interesting to observe—whatever may be the explanation—that while the decline of the mortality rate at the school age-period began twenty to thirty years ago, the decline at the adolescent period did not commence in Aberdeen until within the last ten years. The reduction has taken place largely in tubercular diseases and in diseases of the lungs generally. It is peculiarly satisfactory that these diseases, which have been so much a scourge of this age-period in former years, should show substantial signs of abating their attacks. If the abatement continues, it would form an interesting subject for a future report to inquire more precisely into the causes at work in bringing it about. They may, perhaps, be found in an improved state of general health, and, consequently, increased resisting power, due, perhaps, to the distinctly greater recourse to out-door exercise which I think to be a feature of adolescents at the present day. The football and the cycle may thus have their justification.

The mortality rate at the "*mature*" *age-period* (25-60 years) was also the lowest on record, though it did not fall to the same extent or in the same proportion as the rate at the adolescent period. The decline has taken place in nearly all the principal groups of diseases.

At the *post-mature period* (60 years and upwards) the mortality was somewhat under the average for the preceding ten years, but very slightly above the rate for the previous year.

(*b*) *Mortality in Relation to Cause.*—Tables III. and IV. give details of this for the past year, and Table VI. affords material for a comparison with previous years. The chief causes of death were, in the order of their numerical importance, diseases of the respiratory system, with 467 deaths, or 17 per cent. of the total deaths ; diseases of the circulatory system, with 335 deaths, or 12 per cent. of the total deaths ; tuberculous diseases, with 320 deaths, or 11 per cent. ; miasmatic diseases, with 305 deaths, or 11 per cent. ; and diseases of the nervous system, with 291 deaths, or 10 per cent. Then followed developmental diseases with 169 deaths, malignant diseases with 163 deaths, diseases of the digestive system with 155 deaths, diarrhoeal diseases with 109 deaths, accident and violence with 106 deaths, diseases of the urinary system with 81 deaths, septic diseases with 29 deaths, and venereal diseases with 9 deaths. Besides these, there were 150 deaths attributed to the ill-defined causes of debility, atrophy, or inanition—62 being among children under one year, and 88 among persons above 60 years. There were also 137 deaths from various other miscellaneous causes, thus completing the total roll of 2,826 deaths from all causes. These diseases were, as usual, very unequally distributed over the various periods of life. The mortality from respiratory diseases was chiefly among the very young and the old ; that from diseases of the circulatory system, as also from urinary diseases and from malignant diseases, was mainly among

the old; that from tuberculous diseases was, in the case of phthisis, principally among the adolescent and middle-aged, and, in the case of other forms of tuberculous disease, among the young; that from nervous diseases chiefly at the extremes of life; and that from miasmatic diseases almost wholly in early childhood.

The variations, since the year 1866, in the death-rate from selected causes can be readily followed in Table VI.

The total death-rate from the more common *miasmatic diseases* was considerably higher than in the preceding year, when the rate was, however, unusually low. It was also somewhat above the average for the previous ten years. The high rate was chiefly due to the exceptionally large mortality from whooping cough—the largest recorded for many years. The mortality from measles was also high, but not greatly above the average. The death-rate from scarlet fever was also somewhat high, as compared with that of recent years. The mortality from diphtheria, and especially from typhoid fever, was exceptionally low. After an interval of five years without a death from typhus, there were several deaths from this disease towards the close of the year.

The death-rate last year from *phthisis*, it is gratifying to state, was the lowest on record. It is more fully dealt with under the special heading of "Tuberculous Diseases" further on in the report.

The death-rate from another disease of the lungs—*bronchitis*—was also the lowest recorded, being considerably under the rate in any previous year since the commencement of civil registration. The rate is now, like that from phthisis, less than a half of the average annual rate twenty to thirty years ago, but the fall was slower at first than in the case of phthisis, and has been much accelerated in recent years. The fall is probably due, for the most part, to the same causes as have been operative in reducing phthisis.

The check experienced in 1903 in the steady rise of the death-rate from *pneumonia* did not continue into the past year, the death-rate having risen to 130 per 100,000 of population, or the second highest rate on record. The highest was 134 in 1902. This almost steady rise of the mortality from pneumonia is difficult to explain, more especially in the presence of the fall in the mortality from bronchitis. Perhaps, part of the explanation is to be sought for in this very fact. Some deaths—especially in children—which might formerly have been attributed to bronchitis are, possibly, now set down to broncho-pneumonia and, accordingly, classed with pneumonia. Be that as it may, it is re-assuring to find that the combined death-rate from bronchitis and pneumonia shows a considerable decline within the past twenty years, having fallen by nearly one-third.

The mortality from *diseases of the circulatory system*, like that from pneumonia, has been steadily rising in recent years, although not to the same extent. Last year the rate was less than it had been in any of the preceding four years, but was above the rate in any earlier year. Heart diseases are almost certainly of the class which are bound to figure more largely in a community whose mean age at death is gradually being extended. Diseases of the heart and blood-vessels are largely the product of the degeneration which accompanies the inevitable decay of the human organism. If the organism is saved from death from the more accidental causes, such as an infectious disease, it may survive to die of a degenerative disease, such as heart disease, at a later period. In the numerous examinations which, as a medical jurist, I have made of all kinds of dead bodies, two facts have greatly impressed me. The first is the almost constant occurrence of some degree of scarring and puckering of the apex of the lungs in persons above the adolescent age, as if from the presence in the lungs, at one time or other, of slight tubercular infection; and the second

Table VI.—Deaths from Selected Causes

(per 100,000 of population). — *Years* 1866-1904.

Year,	Miasmatic Diseases.								Diarrhœa and Dysentery. †	Phthisis.	Cancer and other Malignant Diseases.	Bronchitis.	Pneumonia.	Diseases of Circulatory System.	Diseases of Digestive System. †
	Smallpox.	Scarlet Fever.	Diphtheria.	Measles.	Whooping Cough.	Influenza.	Typhus Fever.	Typhoid Fever.							
1904, . . .	0	13	7	58	91	8	5	2	66	120	99	130	130	204	94
1903, . . .	0	8	8	73	27	14	0	2	72	143	81	142	114	213	110
1902, . . .	0	7	13	11	82	29	0	2	53	136	88	144	134	225	100
1901, . . .	0·6	6	10	41	10	27	0	10	18	132	95	162	124	220	177
1900, . . .	0	7	20	37	60	54	0	7	17	166	87	170	123	211	173
1899, . . .	0	11	19	90	34	33	0	15	23	152	98	159	111	179	156
Average 1899-1903,	0·1	8	14	50	43	31	0	7	37	146	90	155	121	210	143
1898, . . .	0	26	25	15	73	23	1	10	22	156	84	173	112	190	188
1897, . . .	0	21	10	17	15	25	0	5	27	152	89	183	106	183	154
1896, . . .	0	44	15	29	86	13	0	4	42	174	88	167	85	162	132
1895, . . .	0	22	9	133	70	61	0	14	52	188	88	226	96	176	151
1894, . . .	1	22	28	52	78	8	0	8	34	179	79	207	113	149	140
Average 1894-98,	0·2	27	17	49	64	26	0·2	8	35	170	86	191	102	172	153
,, 1886-95,	0·6	18	16	73	60	34	1	12	47	185	76	217	105	169	152
,, 1876-85,	0·4	24	22	32	67	1	13	21	58	215	65	268	77	152	131
,, 1866-75,	2·6	72	23	53	67	6	37	42	75	282	59	267	67	133	165

† Classification altered in 1902.

is the practically invariable appearance, in persons of middle age and upwards, of more or less degeneration of the lining membrane of the blood-vessels and of certain of the valves of the heart. The first fact seems to show how widely disseminated is tubercle, and how curable it is in its milder attacks. The second apparently points to an inevitable arterial degeneration for practically all of us, as one of the expressions of the decay from which no living organism is exempt, and is a warning to those who know of it that the same physical risks are not to be taken safely as when the organism was younger and the circulatory apparatus retained all its original elasticity. The quick run for a train, or the heavy lift, which could be made with impunity when younger, is often dangerous in later life, even where the person is quite unconscious of any impairment of his heart or blood-vessels.

I had occasion to remark in the preceding annual report that it afforded some relief to find that the mortality from *cancer* and other similar malignant diseases had for two years been on the decline, after having steadily risen for the past thirty years. I regret to have to point out that the rate for the past year—99 per 100,000 of population—is the largest recorded. The mortality from these diseases has grown by more than one-half since 1875. At no time within historical periods has so much attention been given to the nature and prevention or cure of cancer, as is being given at present. In many laboratories, some of the ablest of scientific investigators are busily endeavouring to discover the secrets of this terrible disease. Some progress has undoubtedly been made, but much ground will still require to be traversed before any results of practical utility to the hygienist or the physician are forthcoming. Cancer, even more than heart disease, is a disease of old age and late middle life, and like heart disease, its growing frequency may be partly the result of the increase of the duration of life.

Owing to the alteration, in 1902, of the classification of *diseases of the digestive system* and of *diarrhoeal diseases*—many of the deaths formerly classed with the former being now transferred to the latter—it is impossible, from Table VI., to ascertain exactly what changes have been taking place severally in these rates, but this may be said that the rate last year in each case was considerably lower than in the preceding year, and that the combined rates were distinctly under the average of the combined rates in the previous thirty years. The fall since 1903 has, for diarrhoeal diseases, been more evident among aged persons than among children, while, for diseases of the digestive system, it has been chiefly confined to persons of middle age and to young children above one year.

MORBIDITY AND MORTALITY FROM ZYMOTICS.

(*Table VII.*)

Table VII. gives the statistics of the morbidity and mortality from the commoner zymotics during the past year, and in each of the preceding ten years. The averages for this decade and for the previous decade are also given. The number of cases or sicknesses is stated for each disease, with the number of deaths, as also the case-mortality or percentage of deaths to sicknesses.

It is necessary to keep in mind that the compulsory notification of measles and whooping-cough was discontinued early in February, 1903. As was explained in the report of that year, an effort has since been made to obtain information of cases of these diseases through the school officers and by voluntary intimation. We believe that we are thus being informed of the bulk of the cases of these two diseases, but the apparently rapid rise of the case-mortality, since notification ceased, points to a not inconsiderable proportion of the cases remaining unreported. The figures

Table VII.—Morbidity and Mortality from Zymotics (Miasmatics)

During each Year from 1894 to 1904, inclusive.

Disease.		1904	1903	1902	1901	1900	1899	1898	1897	1896	1895	1894	Annual Average. 1894 to 1903.	Annual Average. 1884 to 1893.
Small Pox,	No. of Sicknesses.	3	0	0	7	0	1	0	0	0	1	4	1·3	5·7
	No. of Deaths, ..	0	0	0	1	0	0	0	0	0	0	1	0·2	0·4
	Percent. of Deaths to Sicknesses,...	0	*0*	*0*	*14·7*	*0*	*0*	*0*	*0*	*0*	*0*	*25·0*	15·4	7·0
Measles, ...	No. of Sicknesses.	1913	3246	1999	2796	3061	6527	734	1884	1917	2874	2043	2708	1659
	No. of Deaths, ..	95	118	18	63	56	134	21	23	30	172	67	70	70
	Percent. of Deaths to Sicknesses,..	5·0	*3·6*	*0·9*	*2·3*	*1·8*	*2·1*	*2·9*	*1·2*	*1·6*	*5·9*	*3·2*	2·6	4·2
Scarlet Fever, ...	No. of Sicknesses.	589	465	321	385	371	342	1078	1053	1676	596	525	681	548
	No. of Deaths, ..	21	13	11	9	10	16	38	29	62	31	26	25	18
	Percent. of Deaths to Sicknesses,..	3·6	*2·8*	*3·4*	*2·3*	*2·7*	*4·7*	*3·5*	*2·8*	*3·7*	*5·2*	*4·9*	3·6	3·2
Whooping Cough, ...	No. of Sicknesses.	1696	507	3645	591	2471	1377	2968	366	1886	1676	2164	1765	728
	No. of Deaths, ..	150	43	129	16	90	50	106	21	128	95	102	78	62
	Percent. of Deaths to Sicknesses,	8·8	*8·5*	*3·5*	*2·7*	*3·6*	*3·6*	*3·6*	*5·7*	*6·8*	*5·7*	*4·7*	4·4	8·5
Diphtheria.	No. of Sicknesses,	170	182	180	166	128	153	209	93	108	69	113	140	56
	No. of Deaths, ...	12	13	20	14	30	29	37	14	26	12	37	23	19
	Percent. of Deaths to Sicknesses,...	7·1	*7·1*	*11·1*	*8·4*	*23·4*	*18·9*	*17·7*	*15·1*	*24·0*	*17·4*	*32·7*	16·4	33·9
Typhoid Fever, ...	No. of Sicknesses.	37	26	46	163	109	138	180	58	78	105	74	98	101
	No. of Deaths, ...	4	4	3	15	10	22	14	7	5	18	11	11	14
	Percent. of Deaths to Sicknesses,..	10·8	*15·4*	*6·5*	*9·2*	*9·2*	*15·9*	*7·8*	*12·1*	*6·5*	*17·1*	*14·9*	11·2	13·8
Typhus Fever, ...	No. of Sicknesses,	34	0	0	0	0	5	5	0	0	0	1	1·1	19·0
	No. of Deaths, ...	9	0	0	0	0	0	2	0	0	0	0	0·2	2·8
	Percent. of Deaths to Sicknesses,..	26·5	*0*	*0*	*0*	*0*	*0*	*40·0*	*0*	*0*	*0*	*0*	18·2	14·7
Totals, ...	No. of Sicknesses,	4442	4426	6191	4108	6140	8543	5174	3454	5665	5321	4924	5395	3118
	No. of Deaths, ...	291	191	181	118	196	251	218	94	251	328	244	207	187
	Percent. of Deaths to Sicknesses,...	6·6	*4·3*	*2·9*	*2·9*	*3·2*	*2·1*	*4·2*	*2·7*	*4·4*	*6·2*	*4·1*	3·8	6·0

for these two diseases, except in regard to deaths, are, therefore, not strictly comparable with those of previous years.

The statistics show that, during the past year, the total known cases of the seven zymotics embraced in the Table were under the average for the preceding decade, being 4,442, as against 5,395, but were almost the same in number as in the year 1903. By far the most prevalent zymotics were measles and whooping-cough, of which there were 3,609 cases made known to us; and there must have been some hundreds of unreported cases. The unreported cases were, I think, more numerous with whooping cough than with measles. Scarlet fever came next in prevalence, with 589 cases, followed by diphtheria with 170 cases, typhoid fever with 37 cases, typhus fever with 34 cases, and small-pox with 3 cases.

As compared with the preceding ten years, measles and whooping cough were, in respect of the number of reported cases, apparently somewhat under the average in prevalence; but as the deaths from each disease, especially from whooping cough, were greatly above the average, it is probable that, when allowance is made for unreported cases, the sicknesses from each were also above the average. Small-pox, diphtheria, and typhus were likewise above the average in prevalence, thus leaving scarlet fever and typhoid fever as the only two common zymotics that were under the average. In the preceding year all the zymotics, except measles and diphtheria, were under the average.

Small-pox.—Three cases of this disease occurred in the spring of the year, the details and circumstances being fully given in the monthly reports, and a short summary in the last annual report. It is sufficient here to recall that the infection in the first two cases—a trawler and his wife—was got while attending the funeral of a relative in North Shields who had died of small-pox; and that the third case, a female neighbour of the first cases, was infected from these. All were promptly removed to the City Hospital, and all made a good recovery.

Measles, except for the usual seasonal remissions, has been practically continuously epidemic for the past six years, the cases varying from 6,527 in 1899 to 1,913 last year. During these six years, there have been at least 20,000 cases of measles, if a small allowance is made for unreported cases since the stoppage of compulsory notification. Within the same period there have been 484 deaths from the disease, including 95 deaths in the past year. These large figures bear out the statement I have formerly ventured upon, that practically every child in the City takes measles at one time or other in childhood. It is a rule, almost without exception, that, if a case of measles is reported in this City in an adolescent or an adult, the patient has been brought up in the country, where, owing to the sparseness of the population, it is possible for persons to pass through childhood without being attacked by measles. The death-roll from measles during these six years has been a heavy one, though, when allowance is made for the growth of the population, not much heavier than in previous years. Measles, like whooping cough, is constantly exacting a large death-toll from our children. No doubt many of those who die from it are weaklings with diseased chests or bowels, or the victims of tubercle; and measles may thus, to some extent, exercise a wholesome weeding-out of the unfits, but it unfortunately, at the same time, leaves behind it, in those who survive, ailments and defects which may permanently depreciate the efficiency of the individual.

It will be recollected that three years ago I included in my annual report an analysis, which the late Dr. James S. Laing, medical resident at the City Hospital, had made, of the cases of whooping cough notified since the commencement of notification. As the compulsory notification of both this disease and measles has recently been discontinued, I have thought it desirable to

obtain, for future reference and guidance, a similar analysis of the cases of measles, from practically the commencement to the end of notification. Such an analysis has been made, at my request, and under my direction, by a former pupil, Dr. George N. Wilson, now chief assistant Port Medical Officer for Glasgow, and I have pleasure in appending it to this report (Appendix C). The chief lessons of the analysis are, perhaps, three—First, that, in a town like Aberdeen, the vast majority of children take measles before they reach the age of nine, and that it may be assumed for questions of school attendance that there is little danger to others in allowing children from measles-infected houses to continue at school if their class-mates are of the age of eight and upwards ; second, that the disease is greatly more fatal during the first and second years of life, and, in a less degree, during the third year, than in later years, and that it is, therefore, of great importance to use the utmost efforts to protect children from infection during the first three years of life ; and, third, that the mortality is greatly heightened by inferiority of social condition, as measured by the size of the house in which the family of the patient resides. The results generally of the investigation are very similar to those obtained by Dr. Laing in his investigation of whooping cough.

Whooping Cough was distinctly epidemic during the past year, though the full extent of its prevalence was probably not revealed owing to the absence of compulsory notification. Under the present voluntary system of reporting, 1,696 cases were brought to my notice, which is slightly under the annual average for preceding years ; but the deaths amounted to 150, or the largest number for a long series of years. Indeed, the number was not equalled, or nearly approached, in any of the twenty-one years of compulsory notification, and the question naturally suggests itself whether the discontinuance of such notification, by diminishing the control of cases, has helped to raise the case-mortality. It would be premature, however, to draw any such conclusion. After some years' experience of the present system it will be more profitable to discuss the question.

Scarlet Fever was somewhat more in evidence during the past year than it had been in any of the preceding five years, but the number of cases was under the annual average for the previous decade. The fact is, that there has been no large epidemic of scarlet fever in Aberdeen since the three years 1896-1898, when there was an almost continuously high prevalence. The case-mortality (3·6 per cent.) last year was exactly equal to the average for the decade, but was rather higher than it had been in the immediately preceding four years.

Diphtheria has, for about seven years, been rather more prevalent than usual, but the cases last year were slightly fewer than they were in the preceding two years. The case-mortality was 7·1 per cent., which is exactly the same as in the previous year, but less than half the average for the decade. During the last four years the case-mortality has averaged only 8·4 per cent. In the first four years of the last decade it averaged 22·3, and in the decade ending 1893 it averaged 33·9 per cent. This large fall is probably, without a doubt, to be attributed in the main to the increasing use of antitoxin. For a few years after the introduction of antitoxin, it was unusual to find that any case had been treated with it before admission to hospital. As it is of the utmost importance, in order to obtain the full benefit of the treatment, that it should be begun at the earliest possible moment, I am glad to say that its early administration in private practice is now rapidly extending, although there is still room for improvement in respect, at least, of poorer patients. Antitoxin is one of the most expensive remedies, and it is intelligible that the doctor may hesitate to employ it, if the patient or his parents are too poor to pay for it themselves. I think the Town Council might be justified in making arrangements for supplying the material gratuitously in such cases, but only on a certificate of the poverty of the patient from the medical attendant. From our experience in the City Hospital I feel sure that an early and liberal use of antitoxin in the treatment of every case

of diphtheria might be expected to reduce the case-mortality to 3 or 4 per cent. With such a reduction, and having regard to the fact that diphtheria is never a widely-prevalent disease, such as scarlet fever, measles, or whooping cough is, diphtheria would quickly be relegated to a minor place in the zymotics which people fear, and with which the Public Health department has to cope.

Typhoid Fever.—Although the cases of this disease were more numerous than in the preceding year, being 37 as against 26, still they were very few as compared with the average of a series of years. Until three years ago, the average number of cases a year was about 100, and of deaths, about 12 or 13; during the last three years the corresponding numbers have been 36 and 4. It is difficult to suggest an explanation of this remarkable decline. It is apparently not to be found in any local change; for a fall is being experienced in other towns. Perhaps the cause is climatic or telluric; and, if so, it may be temporary. Apart from personal infection, and apart from soil infection, which, I think, counts for little in a town with daily removal of refuse and with a complete water-carriage system, the chief source of the disease is probably contaminated water or milk. The increasing attention which everywhere is being given in both the town and the country to the better regulation of dairies may, therefore, be bearing fruit in a reduced typhoid incidence.

Typhus Fever has been so rare a visitor in recent times, and has attacked so few when it did appear, that a considerable outbreak within the City, in the closing weeks of the year, came as a surprise. As the disease was not recognised until within a few days of the end of the year, and practically the whole work of coping with the outbreak fell within the current year, I propose to leave a complete account of it for the next annual report. Tolerably full information regarding the nature of the outbreak was supplied in my monthly reports, commencing with the report for December, 1904. It may be sufficient at present to say that, after producing 128 cases, with 23 deaths, the outbreak came to a fairly rapid end in the month of April of this year. All the known cases—if discovered before the cases had ended—were, with one exception, removed promptly to hospital, and all ascertainable contacts were either removed to reception wards for observation for three weeks, or kept under observation in their own homes by frequently-repeated visits. There can be no doubt that the strict supervision of the contacts was of the greatest value in assisting in bringing the epidemic to an end. The mortality among the infected children was practically nil, but among persons of middle age and upwards it was very high, and almost beyond the record of the older epidemics. Several of the hospital nurses in attendance on the patients were attacked, and all recovered. The ambulance driver, who was also attacked, unfortunately died. It is sincerely to be hoped that there may be no recurrence of the disease in the coming autumn and winter. It is desirable that the medical practitioners should have a keen outlook for the disease from October onwards. If each case can be properly isolated within a week from its commencement—and the sooner the better—it will be impossible for an outbreak to occur this winter such as happened last winter.

Erysipelas.—As remarked in my last Annual Report, the cases rose to 403 in 1901, from 283 and 282 in the preceding two years, respectively. Since 1901 the cases have been steadily declining, having fallen to 326 in 1902, and to 260 in 1903. Last year they fell still further to 244. Of these, 12 were reported to have ended fatally.

Puerperal Fever.—Owing to the association which is believed by many to exist between puerperal fever and erysipelas, it is interesting to note that, during the past five years, the fluctuations in the number of cases of the former disease have followed fairly closely those of the latter disease. In the five years from 1900 to 1904, the yearly number of cases of puerperal fever was 13, 16, 13, 10, and 10, as compared with 282, 403, 326, 260, and 244 cases of erysipelas.

Influenza was registered as the cause of 13 deaths during the year, as compared with 14 in the preceding year. This is the smallest number of deaths from influenza in any year, except 1894, since the present visitation of the disease began in 1889. I had occasion to examine for myself several undoubted cases in the members of the police force early in the year.

TUBERCULOUS DISEASES.

(Tables III., IV., VI., and VIII.)

The death-rate from phthisis, after rising somewhat in the preceding year, again asserted its tendency to go on declining, the rate last year being 120 per 100,000 of population, or distinctly the lowest on record. The next lowest rates were 132 in 1901 and 136 in 1902. During the ten years, 1866-75, the rate was 282, so that the mortality from this much-dreaded disease has fallen to considerably less than one-half of what it was about thirty years ago. If the same rate had prevailed last year as in 1866-75, there would have been 462 deaths from phthisis in place of 197. There is no more gratifying fact in these statistical returns.

The remarkable feature of this decline is that it has probably arisen from the general improvement in sanitation and in the standard of living, and cannot be claimed as the result of any efforts directed specially against the disease. While I am clearly of opinion that such special efforts should not be neglected, I doubt whether they will be attended with a measure of success approaching in any marked degree the happy results already obtained. It is probable, in my opinion, as in the opinion of most of the earlier writers on phthisis, that the vital power of resistance of the body to the invasion of the tubercular germ is a more important factor in the spread of the disease than the presence of the germ. Without the germ there would doubtless be no phthisis, but the germ is so ubiquitous and abundant, and the circumstances of phthisical cases are so peculiar, as compared with those of ordinary infectious cases, that it is difficult to see how the greatest possible sanitary effort can secure a pure and safe environment for the community generally. Even with an apparently more controllable zymotic, such as scarlet fever, we have, in spite of huge efforts, succeeded but little, if at all, in limiting the spread of the disease and stamping out the germ. I call attention to this point, not to discourage the efforts to deal with phthisis or the phthisis germ directly, but to show that, after all, the chief weapon in the struggle against the disease must continue to be the maintenance, at its highest, of the general health, on which the resisting powers of the body depend. Hence the inestimable value of good feeding, a suitable occupation, and, above all, an abundance of fresh air.

In order to assist medical men in giving directions to their phthisical patients for avoiding the spread of the infection, I prepared, in the course of the past year, a short set of plain instructions, which have been printed on a folding card suitable for the pocket. Copies of these instructions have been supplied to every medical practitioner in the city. A copy is appended to this report. (Appendix B).

Before leaving the subject of tuberculous diseases, it is proper to point out that the large decrease last year in the death-rate from phthisis was not accompanied by a similar decrease in the deaths from tuberculous diseases other than phthisis. On the contrary, these showed an increase, but this was considerably more than counterbalanced by the fall in the mortality from phthisis. The increase in other tuberculous diseases was almost entirely confined to infants under one year of age.

TABLE VIII.—DEATHS AT VARIOUS AGE-PERIODS FROM TUBERCULOUS DISEASES IN YEAR 1904, WITH AVERAGE FOR PRECEDING FIVE YEARS,

Compared with Deaths from Miasmatic Diseases and from All Causes.

	Year.	Number of Deaths.					Proportion of Deaths from Tuberculous Diseases to Deaths from All Causes.
		Phthisis.	Other Tuber-culous Diseases	All Tuber-culous Diseases.	All Mias-matic Diseases.	All Causes.	
All Ages, . . .	1904	197	123	320	305	2826	1 : 9
	Av. 1899-1903	225	112	337	237	2791	1 : 8
Infant Period, . . .	1904	6	82	88	265	1100	1 : 13
0—5 Years, . .	Av. 1899-1903	7	61	68	166	982	1 : 14
School Period, . . .	1904	17	20	37	13	112	1 : 3
5—15 Years, . .	Av. 1899-1903	15	20	35	15	105	1 : 3
Adolescent Period, . .	1904	46	6	52	4	119	1 : 2
15—25 Years, . .	Av. 1899-1903	67	15	82	9	164	1 : 2
Mature Period, . . .	1904	115	13	128	15	654	1 : 5
25—60 Years, . .	Av. 1899-1903	124	15	139	21	701	1 : 5
Post-Mature Period, . .	1904	13	2	15	8	841	1 : 56
60 + Years, . .	Av. 1899-1903	12	1	13	26	839	1 : 64

Sanatorium for Consumptives.—I have referred in each of my more recent annual reports to the need in Aberdeen for a sanatorium for the treatment of poorer consumptives. Aberdeen is now the only one of the four large cities in Scotland that is not provided with such institution in its vicinity. The curative value of sanatoria, as based on the reports of those which are owned privately and run for profit, may, in some instances, be over-stated, but there is now a sufficient body of evidence derived from many years of experience of sanatoria of an entirely public nature, to satisfy any reasonable person that the treatment within such sanatoria is able, in several cases, to arrest completely the progress of the disease, and to effect a virtual cure, and, in a still larger proportion of cases, to ameliorate substantially the condition of the patient, and prolong life. There is, moreover, the educational value of the sanatorium in exhibiting in our midst by far the best means for treating phthisis. I am glad, therefore, to see that Dr. Alexander Walker, as a member of the Parish Council, is raising the question afresh in the interests of the poor. I have been privileged to see the information he is accumulating from other places as to the nature and cost of

consumptive sanatoria for the poor, and, I think, it will show that such a sanatorium may be erected and carried on at a much less cost than has hitherto been supposed to be necessary. If the sanatorium were begun on a modest scale, and if the various public health authorities in the district, recognising it to be a proper adjunct to their present hospital equipment, were to assist in its maintenance, the support required from the public need not be large, more especially if some generous donor, or body of trustees with funds at their disposal for such a purpose, were to provide the buildings. The buildings need not be expensive, and might very well be constructed of wood, or of wood and iron.

Table IX.—Bacteriological Examinations,

made by Professor Hamilton, University of Aberdeen, under agreement with the Town Council.

Year.	Suspected Diseases.												Other Diseases.	Grand Total.
	Typhoid Fever.				Diphtheria.				Tuberculosis.					
	Positive.	Negative.	Doubtful.	Total.	Positive.	Negative.	Doubtful.	Total.	Positive.	Negative.	Doubtful.	Total.		
1904	17	95	0	112	160	162	0	332	83	154	0	237	7	688
1903	24	105	1	130	180	150	0	330	60	95	0	155	4	619
1902	31	79	1	111	162	131	3	296	67	128	0	195	3	605
1901	139	58	2	199	104	172	7	283	61	81	0	142	9	633
1900	108	48	6	162	74	95	4	173	37	64	0	101	4	440
1899	152	37	6	195	92	127	13	232	32	52	0	84	3	514

BACTERIOLOGICAL EXAMINATIONS.

(Table IX.)

In Table IX. is given a summary of the bacteriological examinations made, in the Bacteriological Department of the University, by Professor Hamilton and his special assistant, Dr. Laing, under the agreement between the Town Council and Professor Hamilton, which continues to work very satisfactorily. Considerable use continues to be made of the facilities offered, although, as I have remarked in a former report, there are several medical practitioners in the City who rarely or never take advantage of them.

During the year, 688 examinations were made of material from cases of disease. This is the largest number of examinations made since the inauguration of the arrangement six years ago. Of the 688 examinations, 112 were in cases of suspected typhoid fever, 332 were in cases of suspected diphtheria, and 237 were in cases of suspected tubercle, chiefly phthisis. Material from a few cases of other human diseases, and from one or two diseased carcases was also examined. It will be observed that in only about one-seventh of the typhoid examinations did the Widal Test confirm the suspicions of the medical attendant. In the diphtheria cases the bacteriological examination gave positive results in almost exactly one-half of the cases. In the tuberculous cases a positive result was reported in about one-third of the cases. The proportion of positive results for each disease does not differ very greatly from that of the preceding two years. If the earlier years of the arrangement be included, it will be found that, for typhoid fever, the proportion of positive results

has shown a striking decline since 1901. This change is, I believe, largely to be explained by an alteration in the dilution of blood used in the Widal Test. Formerly the dilution was 1·20; latterly, it has been 1·50.

It is proper to bear in mind, in interpreting Table IX., that the number of positive examinations for each disease is not an accurate index of the number of the total cases of the disease occurring within the City, even did it happen, as it does not, that every known case of the disease is submitted to the bacteriological test. Some cases, especially those under hospital treatment, are examined more than once, and a positive result may be recorded several times for one case, each time counting quite properly as one examination in the Table.

DISINFECTION AND DISINFECTANTS.

I referred in my last annual report to certain experiments with Lingner's Disinfecting Apparatus, and with various disinfectants, which had been undertaken, at my request, by Dr. Andrew R. Laing, the special assistant for city work in the Bacteriological Department of the University. I gave a very brief summary of the results of these experiments, which had been carried out only a short time before the report was written. Since that time Dr. Laing has prepared a complete account of these experiments, and of a few others which he subsequently made, and I have pleasure in including it in the appendix to this report (Appendix D).

The investigation makes no pretence to being exhaustive. The subject is a very large one, and my immediate objects in asking Dr. Laing to undertake the investigations were, first, to test the disinfecting efficiency of Lingner's apparatus under such conditions as occur in the routine practice of a busy sanitary department, where it is difficult to secure such favourable conditions as might easily be commanded in a specially contrived experiment in a laboratory. Lingner's apparatus has been devised for the disinfection of rooms by a form of fumigation; but it is generally stated that a necessary condition for the success of the fumigation is that the room should be carefully sealed up, by pasting paper over all open joints, as round doors and windows. This, however, is a tedious preliminary to room fumigation, and, I am afraid, is not always attempted. Even when such sealing has been effected, there may still remain many crevices in the floor and skirting, and, in dilapidated houses, even in the plaster of the walls, which it is impracticable to close. Accordingly, I was anxious to learn if Lingner's apparatus would be effective in the room of an old and well-worn house, such as we have frequently to deal with in the poorer parts of the City, with no sealing of the room, beyond shutting the windows and the door, and stuffing the chimney with paper. I also wished to know if a comparatively short exposure of the room to the action of the disinfectant would be sufficient. The exposure was, accordingly, limited to three hours. In disinfecting a one- or two-roomed house, unless the occupants are removed overnight to a reception house, it is necessary to carry out the disinfection within a few hours. Time has to be allowed for removing the patient and articles of bedding before the fumigation can be begun, and time is required, after the fumigation, to permit the pungent vapour of the disinfectant to become dissipated, as also for the thorough washing of the room and furniture. It is satisfactory to find from Dr. Laing's tests that a good result may be expected from the Lingner apparatus, even when used under the conditions stated. The apparatus, which is more fully described in Dr. Laing's report, is a spray apparatus with four nozzles, through which saturated formaldehyde solution, or formaline, is driven into the room in the form of a voluminous fine spray or cloud by pressure from the steam of

an attached boiler. It succeeded in killing within three hours the germs of tubercle and typhoid, sporing anthrax, the bacillus coli communis, and the staphylococcus pyogenes aureus, even when placed beneath two layers of an ordinary blanket. The makers recommend that glyco-formal—a mixture of formaline and glycerine—should be used, but there can be no doubt that equally good results are obtainable with formaline alone, and at a considerable saving in cost. The quantity of formaline recommended by the makers is quite sufficient. The results from the apparatus were such as, in our opinion, to justify its being relied upon for the complete disinfection of a room and its contents, provided the articles are all properly hung up and exposed to the action of the disinfectant, and provided there is no reason to suppose that the infection has penetrated deeply into such articles as mattresses. The apparatus might, therefore, be used as a substitute for steam disinfection in cases of the commoner zymotics, where the utmost thoroughness in disinfection was scarcely demanded, or, at all events, as a more powerful substitute for the usual sulphur fumigation. We have for some time been making considerable use of the apparatus in the work of the Sanitary department, but, so far, only in combination with steam disinfection of articles of clothing and bedding. We used it, for example, in every case of typhus throughout the recent outbreak. We still make large use of sulphur fumigation. It is, of course, much cheaper than formaline fumigation, and requires no apparatus, and is probably adequate for exposed surfaces ; but with such fumigation we rely absolutely upon steam disinfection for dealing with the bedding and clothing. For routine disinfection for the commoner zymotics in a town, where a steam disinfecting apparatus is always in operation, and where the distances are short, it is doubtful whether, in regard to economy of cost and time, it is possible to improve upon the combination of steam disinfection and sulphur fumigation, with, of course. a thorough washing-out of the room. In country districts, where a steam apparatus is not in constant readiness or may not exist, and where the distances are usually considerable, Lingner's apparatus would appear to be quite sufficient for all the commoner and less dangerous zymotics, if combined with the soaking, in a suitably disinfectant solution, of all articles which can bear to be so treated. For small-pox or typhus or plague, more thorough measures would, of course, be resorted to.

Dr. Laing also tested the disinfecting power of the Alformant lamp, but the lamp was found to be much less efficient than Lingner's apparatus, even when the paraform was in considerable excess of the proportion recommended by the makers.

Thursfield's apparatus is constructed on the same principle as Lingner's apparatus, but it has a smaller boiler and only one spray nozzle. I have tried it, and am satisfied that it is considerably less effective than Lingner's apparatus.

Dr. Laing's investigation extended also to testing the disinfecting powers of formaline and certain other disinfectants when used, in the ordinary way, for steeping infected articles. On account of the great reputation which formaline enjoys as a disinfectant, we have been using it for several years in the sanitary work of the City, to the exclusion of nearly all other disinfectants. There can be no question as to its disinfectant action, but the experiments of some of the more recent observers have tended to raise doubts as to the strength of solution required to produce a reliable effect. The results of Dr. Laing's investigation justify these doubts, and shew that while the inhibitory or antiseptic power of formaline is doubtless very great, its actual disinfectant or germ-killing power is less than has generally been supposed ; and they make it evident that the solution of formaline should not be of less strength than 5 per cent. Indeed, he found that the now somewhat discarded carbolic acid was probably twice as powerful as formaline. He also found, in

testing, certain other well-known disinfectants—cyllin, izal, corrosive sublimate, and sanitas—that, with the exception of sanitas, which was the weakest of all the disinfectants tried, they were all much more powerful than either formaline or carbolic acid. For example, cyllin apreared to be about ten times more powerful than carbolic acid, and, therefore, twenty times as powerful as formaline ; and izal was probably twice as active as cyllin.

Such experiments do not, of course, wholly settle which disinfectant should be used for sanitary purposes. There is the question of cost. If one disinfectant, which is twice as powerful as another, costs four times as much, it will be cheaper to use the weaker disinfectant, but employing it in twice the strength of solution required for the dearer disinfectant. As the expenditure on disinfectants by the Sanitary department of a large town amounts annually to a considerable sum, the question of the price of the disinfectant cannot be ignored. Formaline is cheaper than pure carbolic acid, but considerably dearer than crude carbolic acid, which is quite sufficient for all ordinary disinfecting purposes. Corrosive sublimate, cyllin, and izal are all more expensive than formaline, but solutions of these bodies of the same disinfectant power as solutions of formaline are decidedly cheaper than the latter. Viewed from the standpoint of cost, in combination with activity, formaline must, therefore, be ranked low.

Again there is the question of the poisonousness of the disinfectant to human beings. It is undesirable and dangerous to use for everyday disinfection substances which, although efficient as disinfectants, may be dangerous poisons. Corrosive sublimate is such a substance. It is scarcely less poisonous than arsenic. Cyllin and izal are said to be practically non-poisonous. Formaline is also believed to possess little toxicity. Its very pungent taste would certainly prevent much of it being swallowed. Carbolic acid is probably more poisonous than any of those named, except corrosive sublimate, but it is not nearly so poisonous as that body. In point of non-toxicity, formaline is therefore entitled to a high place, but so are cyllin and izal.

There is also the question of the damage which may be done to coloured articles by the chemical action of the disinfectant ; but there is no objection to formaline on this ground, nor to any of the others named, with the possible exception of corrosive sublimate.

Then there is the not unimportant question of the pertinacity of the odour of the disinfectant in a room or in clothing disinfected by it. Corrosive sublimate has no odour. All the others experimented with have a well-marked odour, which may be more or less disagreeable to many persons. Formaline being a solution of a gas, although it has a highly pungent odour, quickly loses its odour when used for spraying or fumigating rooms, or for steeping clothing. Cyllin and izal are composed of much less volatile bodies, and if used for spraying a room, their odour will cling to the room for days afterwards, but it is not intolerable or repulsive. When used for steeping purposes, even although the clothing has been afterwards rinsed in two or three quantities of water, I have found that the odour may be retained in the clothing for several days, but it eventually disappears. The odour of carbolic acid is well known to nearly everybody. It is also continued for some time in places or articles disinfected by it, but, owing to the volatility of the acid, it is not nearly so persistent as the odour of cyllin or izal. Sanitas has a not unpleasant aromatic odour, and this is one of its chief recommendations. The odour is fairly persistent.

It is apparent that, in the practical use of disinfectants, various matters must receive attention in addition to the germicidal power. For example, for 'fumigating' a room, it might be suggested, in view of the high disinfectant efficiency of cyllin or izal, that solutions of these should

be used in place of formaline in Lingner's apparatus, but the strong and persistent odour of these substances in the room, probably for days afterwards, is a serious objection. Moreover, it is exceedingly doubtful if izal or cyllin thus applied would affect more than the mere surface of the exposed articles. There is no gas in them to become disengaged as there is in the formaline when blown into spray. From such considerations as these, I am of opinion that for use with the Lingner apparatus, or in any like mode of 'fumigation,' formaline is probably the best and most certain disinfectant known to us at present. It is, no doubt, somewhat expensive, and much more so than sulphur fumigation, for there is the cost not only of the considerable quantity of formaline required, but also of the necessary spirit to heat the boiler. Even when the formaline and the methylated spirit are purchased in quantity at the lowest price, the cost of the materials for the fumigation of a room of ordinary size is about 2s. 3d. Fumigation by sulphur, which is, however, less efficient, costs for material only 3d., and requires less attention. Where several thousands of house fumigations are required in the course of a year the difference in cost between the two methods would, therefore, be considerable.

For steeping purposes, as where bed-sheets and underclothing are disinfected by soaking them in a disinfectant, I believe cyllin or izal, or other similarly composed disinfectant to be more serviceable than formaline. Although both of these bodies are more costly than formaline, a weak solution of them (say 1 : 500) is as effective as a solution of formaline twenty times stronger. If the cost is of no moment, and it is desired that the articles disinfected should quickly or at once lose the odour of the disinfectant, then formaline is preferable, but it should be used in a solution of at least 5 per cent There is also much to be said for the use of carbolic acid. Although about ten times less active than cyllin or izal, its cost, in its crude but nevertheless very active form, is greatly under the cost of these bodies ; so that by using a ten times stronger solution of carbolic acid than of cyllin, we can obtain the same disinfectant effect at a cost which is not prohibitive. Such a consideration, at any rate, makes us a little less dependent on disinfectants which have the objection of being proprietary or patented. I have set aside corrosive sublimate because of its poisonousness, and sanitas because of its being both a weak and a somewhat expensive disinfectant.

COMPARISON WITH OTHER TOWNS.

A comparison is made in Table X., in respect of the birth, marriage, and death rates, between Aberdeen and seven other large towns in Scotland during the year. The table summarises for the year the comparisons made in my quarterly reports.

It shows that Aberdeen had the third highest *birth-rate* (29·8 per 1000), Glasgow and Greenock being higher. In the preceding year Aberdeen stood second, Glasgow alone having a higher rate. It is worthy of note that in each of the towns, except Greenock, the birth-rate is lower than in the preceding year, the fall in most cases being substantial. The town with the lowest birth-rate in both years was Edinburgh, the rate last year being only 23·4.

In respect of the *marriage-rate*, Aberdeen, last year, occupied the highest place, with a rate of 9·2 per 1000. Glasgow came very close, with 9·1. The lowest rate was in Leith, with 6·5. In the preceding year Aberdeen occupied the third place, Edinburgh and Glasgow being higher.

TABLE X.—BIRTH, MARRIAGE, AND DEATH RATES DURING THE YEAR 1904.
PRINCIPAL TOWNS IN SCOTLAND.

	Glasgow.	Edinburgh.	Dundee.	Aberdeen.	Paisley.	Leith	Greenock	Perth.
Estimated population (*in thousands*).	798	332	164	164	84	81	70	34
Birth Rate (*per* 1000 *of population*).	31·0	23·4	27·6	29·8	29·1	29·2	30·0	23·9
Marriage Rate (*per* 1000 *of population*).	9·1	8·7	7·9	9·2	7·2	6·5	7·2	9·0
Death Rate (*per* 1000 *of population*).								
(*a*) From all causes, and at every age	19·3	16·6	20·2	17·2	18·8	14·7	17·8	17·9
(*b*) From all causes, and under 5 years of age	59·1	43·1	66·4	54·7	52·8	42·2	51·2	40·7
(*c*) From zymotics (miasmatic) at every age	1·7	1·1	1·5	1·9	2·0	1·2	2·2	1·0
(*d*) From all causes, exclusive of zymotics (miasmatic) at every age	17·6	15·5	18·7	15·3	16·8	13·5	15·6	16·8

As regards the *death-rate* from all causes and at all ages, Aberdeen had the third lowest rate (17·2 per 1000). The two lowest rates were in Leith (14·7) and Edinburgh (16·6). In the preceding year Aberdeen occupied the fourth place, Perth, in addition to Leith and Edinburgh, having lower rates. Among children under five years of age, it is not satisfactory to find that Aberdeen, with 54·7, had the sixth lowest rate, all being lower, except Dundee (66·4) and Glasgow (59·1). From miasmatic diseases, at all ages, the death-rate in Aberdeen (1·9) was the third highest, those of Greenock (2·2) and Paisley (2·0) being higher. From all causes, excluding miasmatics, the rate in Aberdeen (15·3) was the second lowest, Leith alone having a lower rate (13·5).

HOUSING OF THE WORKING CLASSES.

On the report of the Sanitary Inspector and myself, 11 separate dwelling-houses, occupied by the working classes, were closed during the year by order of the Town Council, under Section 72 of the Aberdeen Corporation Act, 1881, on account of their being unfit for human habitation. Six of the houses were situated in West North Street, where several houses had been closed by order of the Council in the previous year; they were dilapidated and defectively lighted. Four were in Leadside Road; they were much dilapidated. One was in Holburn Street, and was closed on account of excessive dampness. In addition to these houses, 16 houses in Scott's Court, Regent Quay, were reported for closure towards the end of the year, and were subsequently closed by order of the Council in the present year.

During the year, on a report from the Sanitary Inspector and myself, 4 houses in West North Street, which had been closed by order of the Town Council in the previous year, were re opened by resolution of the Council revoking the closing order. They had, in the interval, been completely overhauled and rendered habitable.

The Town Council also, on the report of the Sanitary Inspector and myself, and under powers contained in Section 35 of the Aberdeen Police and Improvement Act, 1900, passed a resolution ordering the demolition of a tenement of dwelling-houses in East North Street, which had been closed, under the Act of 1881, in the previous year. The building was very dilapidated, and, as it stood in the rear of another tenement, and within a few feet of it, it interfered seriously with the light and air of this tenement. The resolution was allowed to become effective without an appeal to the Sheriff, as provided for under the Housing of the Working Classes Act, the procedure in which is applicable, in this matter, to the Local Act.

At the request of the Town Council, on a motion by one of its members, a report was also submitted under the same section of the Local Act of 1900, regarding several houses in Rennie's Wynd, which had been closed some years previously, under the Act of 1881. They had not meanwhile been rendered fit for ordinary human habitation, but most of the rooms had now come to be occupied as mere stores by small dealers, for which purpose they were not altogether unsuited. One reason for closing the houses as dwellings was the former occasional recurrence of sewage floodings in them in times of storm. As sufficient steps had now been taken to prevent these floodings, and as the Sanitary Inspector and myself could not satisfy ourselves that, as required by the Act, the continuance of the houses would be dangerous or injurious to the health of the public, or of the inhabitants of the neighbouring dwelling-houses, we reported that we were unable to recommend that a resolution should be passed for their demolition. With this view the Town Council concurred.

Parliamentary sanction has now been obtained by the Town Council for the large improvement scheme referred to in my last report, under which a large amount of old and somewhat slum property in the heart of the City will be removed. No practical commencement has, however, yet been made with the execution of the scheme.

I have once more to report that the houses in the Fishers' Squares are still without adequate sink and water-closet accommodation. The particular difficulty, as stated in previous reports, is that the houses, which are of a working-class character, are mostly owned by the occupiers, who say they have not means enough to enable them to provide the required sanitary conveniences. There appears to be no remedy but the usual one of seeking to compel them by recourse to judicial procedure. Although it may appear harsh to say so, the safety of the general community, as well as of the particular occupants of a house, demands that no one should own a house who is not able to keep it in proper habitable condition and provide it with the necessary sanitary equipment.

The Corporation Lodging-house continues, financially, to be in a much more satisfactory condition than it was a few years ago. Its income is now more than sufficient to meet the expenditure and interest on loans It is an admirable institution, and is well conducted, and is of great service to a section of the population who are not altogether undeserving of sympathy. It is also of great advantage from a public health standpoint.

WORKSHOPS.

(Table XI.)

The number of workshops registered at the end of the year was 1,233, as against 1,190 at the end of the preceding year.

The following tabular summary of the work done during the year, by the Sanitary Staff, in the inspection and regulation of factories and workshops, has been prepared in accordance with the requirements of the Secretary of State :—

Table XI.—Factories, Workshops, Laundries, Workplaces, and Homework.

1.—Inspection.

Premises.	No. of Inspections.	No. of Written Notices.	No. of Prosecutions.
Factories (including Factory Laundries),	245	21	—
Workshops (including Workshop Laundries),	1,669	285	—
Workplaces,	86	2	—
Homeworkers' Premises,	104	0	—
Total,	2,104	308	—

2.—Defects Found.

Particulars.	Number of Defects. Found.	Remedied.	Referred to H.M. Inspector.	Number of Prosecutions.
Nuisances under the Public Health Acts:—				
Want of cleanliness,	177	143	—	—
Want of ventilation,	9	5	—	—
Overcrowding,	2	2	—	—
Want of drainage of floors,	—	—	—	—
Other nuisances,	46	21	—	—
Sanitary accommodation: insufficient,	12	8	—	—
Sanitary accommodation: unsuitable or defective,	56	23	—	—
Sanitary accommodation: not separate for sexes,	6	4	—	—
Offences under the Factory and Workshop Act:—				
Illegal occupation of underground bakehouse (S. 101),	—	—	—	—
Breach of special sanitary requirements for bakehouses (SS. 97 to 100),	—	—	—	—
Failure as regard lists of outworkers (S. 107),	—	—	—	—
Giving out work to be done in premises which are unwholesome (S. 108),	—	—	—	—
Giving out work to be done in premises which are infected (S. 110),	—	—	—	—
Allowing wearing apparel to be made in premises infected by scarlet fever or smallpox (S. 109),	—	—	—	—
Other offences,	—	—	—	—
Total,	308	206	—	—

3.—Other Matters.

Class.	Number.
Matters notified to H.M. Inspectors of Factories :—	
Failure to affix Abstract of the Factory and Workshop Act (S. 133),	0
Action taken in matters referred by H.M. Inspectors as remediable under the Public Health Acts, but not under the Factory Act (S. 5) — Notified by H.M. Inspector,	32
Action taken in matters referred by H.M. Inspectors as remediable under the Public Health Acts, but not under the Factory Act (S. 5) — Reports (of action taken) sent to H.M. Inspectors,	32
Other	0

Underground Bakehouses (S. 101) :—

In use during 1903,	15
Certificates granted in 1903,	4
Certificates granted in 1904,	6
In use at the end of 1904,	10

Homework :—

Lists of Outworkers (S. 107) :—

	No. of Lists.	No. of Outworkers.
Lists received,	9	129
Addresses of outworkers forwarded to other Authorities,	4	
Addresses of outworkers received from other Authorities,	0	

Homework in unwholesome or infected premises :—

	Wearing Apparel.	Other.
Notices prohibiting homework in unwholsome premises (S. 108),	—	—
Cases of infectious disease notified in homeworkers' premises,	—	—
Orders prohibiting homework in infected premises (S. 110),	—	—

Workshops on the Register (S. 131) at the end of 1904 :—

Bakehouses,	32	Milliners,	63
Blacksmiths,	39	Painters,	49
Cabinetmakers,	39	Plumbers,	33
Coopers,	30	Stonecutters,	35
Dress and Mantle Makers,	124	Tailors,	130
Fishcurers,	84	Other workshops,	631
Joiners,	44	Total No. of workshops on Register,	1,233

Much arduous and valuable work has recently been done by the Sanitary Inspector and his staff in bringing the workshops in the City into accordance with the latest requirements. As a result, the conditions under which the workers carry on their employment are now considerably improved. Some of the older workshops, especially those which are more or less below the level of the adjacent street are still defective in light and ventilation, but these defects are inherent in their situation, and where possible they are being improved as far as circumstances will permit. The chief want now is that the workers should sufficiently realise the value of an abundance of fresh air as the best safeguard against ill-health. It is still too common to find in workshops that there are ample appliances for ventilation, but that little or no use is being made of them. No doubt in practice it is often difficult to secure ventilation without inducing what is felt as a draught. Ventilation, as a practical science, is still very far from finality. Perhaps half a century hence it may be said of us in the present day that we had only made an indifferent beginning. An ideal

ventilation is one in which the air diffuses in from all sides. Accordingly there is no better ventilated dwelling than the primitive tent, with its porous walls. If those of us who must of necessity carry on our work under cover could be permitted to work under canvas during the summer months when we are independent of artificial heat, we would lay up such a store of health as would greatly help to carry us through the winter. But this is an impracticable proposal for most. I give it place, however, in order to indicate to some ingenious mind the principle of the method by which the problem of ventilation may be solved. It is not the amount of the incoming fresh air which creates the uncomfortable and often dangerous draught; it is the manner of its entry. A steady stream of fresh air on one side of the body, with a well of warm and probably foul air on the other side, is intolerable to many persons, who would enjoy fresh air if coming in all round.

Though there are undoubted difficulties in securing an ample, yet comfortable, ventilation in many workshops, it cannot be too strongly impressed on every worker, and on every foreman of a workshop, that it is worth taking infinite pains to obtain such ventilation, and to exercise ingenuity in divising means of securing it without discomfort to any one. Most of the small but constantly troublesome ailments of mankind vanish in a life lived in fresh and pure air; and some of the more dangerous diseases, such as consumption, are kept at bay.

One other observation in regard to workshop life I wish to make. It is not enough to obtain good and sufficient ventilation; the position and attitude of the worker ought, as far as possible, to be such as to allow proper play of the chest and lungs in breathing. Much ill-health is caused by the bent, crumpled attitude of the workman at his bench, or, it may be, of the clerk at his desk. Much attention is very properly given now-a-days to the attitude of the child in school. The height of desk and seat is properly adjusted, and so on. There can be no question of its being equally necessary to continue such precautions when the youth enters the workshop or the office; but one looks almost in vain for evidence of their recognition.

Bake-Houses.—The bake-houses were, as usual, inspected every quarter during the year, and were found, as a rule, to be in a satisfactory condition. The new requirements of Section 101 of the Factory and Workshop Act, 1901, in regard to the certification of underground bake-houses came into force at the beginning of the year. The steps taken to ensure that the law would be complied with were detailed in the report for 1903. I have only now to state that, with the exception of a few bake-houses in which, through misunderstanding or otherwise, the requirements of the Act were not fully met until a few weeks later, all the bake-houses within the City had complied with these requirements about the commencement of the year, either by altering their premises or by ceasing to use such parts of the premises as did not satisfy the requirements. There can be no doubt that the Act has substantially improved the conditions under which this important industry is now being carried on; and many of the bakers, though grumbling at first, would be the readiest now to confirm this statement.

Dairies.—I desire to direct attention to certain important prosecutions which were undertaken, towards the end of the year, against two separate dairymen, for an infringement of the bye-laws relating to dairies, in that both had failed to keep their cows clean, and to cleanse properly the udders and teats of the cows before milking, and that one had also failed to provide his cows with clean bedding. Both had been sufficiently warned before the charge was finally made. After a considerable amount of evidence on both sides, a conviction was obtained against the dairyman charged with the two counts. The case against the other dairyman, with regard to whom there

were some extenuating circumstances, was found not proven. It was plain from the evidence for the defence that several dairymen had very crude notions of what constituted cleanness in cows. Large areas of old hardened manure on the hindquarters and tails of several of the cows, with spots of it on the flanks and udders were sworn to by the witnesses for the prosecution, among whom were included the Sanitary Inspector, the Veterinary Inspector, and myself, and yet some witnesses for the defence, either denied the existence of the filth, or said it was of no consequence. Some experienced dairymen gave evidence—I have no doubt quite honestly—to the effect that it was dangerous to wash a cow's udder, as a weed might be induced.

In my opinion, there is no more important regulation in the whole of the dairy bye-laws than the bye-law relating to the cleansing of cows and the washing of their udders. The same bye law also requires that the hands of the milkers shall be properly cleansed before milking is commenced. Cows should be as well kept and as well groomed as horses. A man who would be ashamed to drive a horse with a coating of hardened manure on its legs, and without the trace of a curry-comb in its hair, thinks nothing of drawing the milk—one of the most delicate of foods—from a cow more or less encrusted with sharn from hoof to rump, and with no cleaning or washing of the udder and teats. Even the milkers' hands may not be very scrupulously cleaned. What wonder, therefore, that at the bottom of a glass of milk from such cows may sometimes be seen brownish particles of manure, and that the milk is flavoured by it. The excrement of all animals contains germs in great abundance; and many of these germs, even from an animal in ordinary health, are such as may set up gastric and intestinal irritation when swallowed by human beings, and especially by infants and invalids. The notion of such contamination is repulsive, and would be still more so, were it not that long custom has dulled our apprehension of it. These prosecutions have had a good effect on the dairies within the City. It is to be hoped that they may have an equally good effect on dairies outside the City. There are, of course, both within and without the City, dairymen who have always been scrupulously careful in these matters; but, I fear, there are also not a few that, either through ignorance or through carelessness, fail in their duty to the community, who trust to them for a pure and safe supply of milk.

The appointment by the Town Council, during the past year, of a Veterinary Inspector with a view especially to the systematic and periodic examination of the cows in all dairies within the City will materially assist in securing that the milk from these dairies will be free from any disease, such as tubercle, which might be communicated in the milk, and will also tend towards the maintenance of a higher standard in the management and care of the cows. Mr. M'Lauchlan Young, the Lecturer in Veterinary Hygiene in the University, was appointed to the office, and has been rendering useful service to the Sanitary department.

An effort has recently been made by the Town Council, but as yet without success, to induce the numerous dairy farmers outside the City who supply milk to the City to submit voluntarily their herds to the periodical inspection of the veterinary officer of the Corporation. A conference was a short time ago held between representatives of the Town Council and of the dairymen, at which the proposal was not, on the whole, favourably received. But the dairymen desired time for fuller consideration, and are to give their final answer later. In order to satisfy their desire for definite information as to the possible occurrence of tubercle in milk as supplied in Aberdeen, I have arranged for some inoculation tests being made in the Bacteriological Department of the University.

Inspection of Plans.—As usual, a considerable number of plans of workshops and factories, especially of those in which foodstuffs are prepared, or in which there was any apprehension of

nuisance, were examined and reported upon by the Sanitary Inspector and myself, under arrangement with the Burgh Surveyor, to whose department the inspection of all plans falls. Thus, 17 plans for the erection, extension, or alteration of workshops or factories were reported upon, exclusive of the plans of premises in which offensive trades, as defined by the Public Health Act, are conducted. In the previous year the number of plans examined was fully twice as large. The fall is due largely to the recent check in the growth of the fishing industry, from low or absent profits. The bulk of the plans in previous years related to fishcuring and provision-curing works. The huge increase of fishcuring works in recent years has added very greatly to the smokiness of the atmosphere of the City. The low-lying part of the town around the docks is now, because of the presence of the kilns of the fishcuring works, constantly enveloped in an atmosphere of smoke. As the smoke is necessary for the curing of the fish, and as fishcuring is now one of the most important industries of the City, it is difficult to see what can be done to mitigate the nuisance. It is, however, quickly rendering this part of the town intolerable for residential purposes.

OFFENSIVE TRADES.

The offensive trades in Aberdeen, within the meaning of the Public Health Act, are concerned chiefly with tallow melting or oil extracting (from ox bones or fish livers), soap boiling, slaughtering, hide factoring, and the manufacture of manures. As in the preceding year, few complaints were received regarding any of these trades during the year, and none was of a serious character. I had occasion in the two preceding reports to refer to complaints regarding the drying of dreg at a distillery in the city, and to the trouble experienced in making the owners realise that the odour could be more or less prejudicial to health. The owners of the distillery, under pressure from the Public Health Committee, had latterly been at some expense to improve matters, though with no great measure of success. The subject is, however, for the time closed by a disastrous fire which destroyed almost the whole distillery.

Five applications were made to the Town Council during the year, under Section 32 of the Public Health Act, for sanction to establish businesses coming within the list of offensive trades as defined in the Act, and were reported upon by the Sanitary Inspector and myself. Three were granted. One of these was for a soap work in St. Peter Street, in which the soap was to be wholly for toilet purposes, and was to be made by the so-called "cold process." We were assured that there would be no offensive odour from the work, but there has been little opportunity of testing the value of this assurance, as there was much delay in starting the business owing to the sudden death of the principal owner. Another was for a small business of weasand drying in Millbank Lane. The third was for the extraction of cod liver oil at Point Law. In all cases sanction was given, on an undertaking from the person conducting the business, that it would forthwith be discontinued on his being called upon to do so by the Town Council because of nuisance. In regard to the remaining two applications, one, for tallow melting, in premises in King Street, was reported against by the Sanitary Inspector and myself owing to the close investment of the premises by dwelling-houses, and was subsequently withdrawn; the other, for gut-cleaning in premises in Canal Road, was also withdrawn, after consultation with this department, owing to the unsuitability of the premises and site.

In addition to these applications for new premises, applications were also made for the extension of the premises of four existing businesses, viz., of a manure manufacturing business in Millar

Street, soap works in Loch Street, gut-cleaning at Albert Quay, and a slaughter-house in Charles Street. All were granted, after the plans had been adjusted to meet the requirements of the department.

Slaughter-Houses.—An important feature of the year in regard to the slaughter-houses was the preparation of new bye-laws for their regulation, under the powers conferred in the Public Health Act. These bye-laws, after being fully considered by the Public Health Committee, who had also before them informally the views of the butchers themselves, were approved by the Town Council. They were then submitted to the Local Government Board for confirmation, which was granted on 10th September, after representations from the Aberdeen Flesher Incorporation against certain of the bye-laws had been duly considered and set aside. Much care was given to the preparation of the bye-laws, in order to secure that not only would the business be conducted in a proper manner, but that also the structure of the premises would be in keeping with modern requirements. When the bye-laws came into force, none of the nine slaughter houses in the City was in conformity with these requirements, and, accordingly, a period of several months was allowed for carrying out the necessary alterations. In some cases, compliance with the bye-laws means the entire re-construction of the premises. Up to the present time, only two of the slaughter-houses have been brought into line with the bye-laws. The remainder have either submitted plans, or are about to submit plans of re-construction, or are arranging to close. It is evident that the structural requirements of the bye-laws, which are not unreasonable or excessive, are to involve the owners of the slaughter-houses in a large expenditure. As the two largest of the slaughter-houses still remain to be dealt with, and the owners are evidently anxious about the large expenditure, the question is seriously raised as to whether it is yet possible for the Town Council to go back upon its last resolution, refusing to proceed with the erection of a public slaughter-house. One conveniently-situated, well-planned, and properly-managed slaughter-house, into which the whole of the slaughtering could be brought, would be by far the best arrangement in the interests of public health and decency, and would soon be found to be the best also for the butchers themselves. The strict enforcement of the bye-laws is, I think, bringing this home to all concerned, and it would be a pity if this last opportunity were lost of rectifying what, I humbly and respectfully think, was a wrong step. Once the existing slaughter-houses have had thousands of pounds spent upon them to meet the demands of the bye-laws, the erection of a public slaughter-house will have to be indefinitely postponed, if not for ever abandoned. With the large meat trade which the City possesses, there is no reason why a public slaughter-house should cost the ratepayers anything.

With regard to the part of the bye-laws applicable to the conduct of the business, we have already found distinct advantage, from them, in the detection of diseased meat, particularly from the bye-law which compels intimation, to the Sanitary Inspector, of any carcase which exhibits any disease or appearance of disease or unsoundness, as also from the bye-law which forbids the removal from a slaughter-house, without the written consent of the Sanitary Inspector or Medical Officer of Health, of any living animal or any carcase which exhibits any disease or appearance of disease or unsoundness.

Flock-Making.—Attention has recently been directed by the Sanitary Inspector of Glasgow to the dangers of flock as made at present. The subject is not a new one, as it was reported upon some years ago by an inspector of the English Local Government Board, and I devoted to it a part of my report for 1900. But it is very desirable that it should be repeatedly pressed upon the attention of public authorities and Parliament until powers are obtained to compel the use of some suit-

able method of cleansing or disinfecting the rags previous to their being converted into flock. As I stated in my former report, these flock mills receive large quantities of used and filthy rags and clothing, which, without any previous cleansing or disinfection, are teased by machinery into so-called flock. This, again without any cleansing, is used by upholsterers for the stuffing of mattresses, pillows, cushions, couches, chairs, and other articles in which flock is of service. Not all flock is prepared from soiled rags, but much of it is. It is far from satisfactory, and is, indeed, a serious menace to the public health, that what is described and sold as a new flock bed or flock-stuffed article of furniture is really stuffed with teased filthy rags, collected throughout town and country from all kinds of houses and people. It cannot fail that in many instances the rags had formed part of the clothing of persons suffering from infectious and loathsome diseases. Through the efforts of the Glasgow Corporation, it is satisfactory to find that the Government Authorities are apparently realising more fully than formerly the need for legislation on the subject.

WATER SUPPLY.

I feel it to be my duty, year after year, to utter a warning note regarding the water supply of the City. There is no tangible evidence as yet of the water having been the source of any outbreak of disease, but there must always exist the possibility of such an outbreak so long as the water is drawn from a river which is open to sewage pollution above the point of intake, and the water is not filtered. If such an outbreak were to occur, the experience of other places shows that it might be of a dangerous character and assume alarming proportions. The care taken in recent years by the Water Department to exclude, as far as practicable, all visible sources of pollution above the intake, and to keep the aqueduct in a proper state of repair, has, no doubt, greatly helped to reduce the danger, but some degree of danger still exists, and is inseparable from the present scheme, unless provision were made for the filtration of the whole supply.

SEWERAGE.

The large and costly scheme for carrying the great bulk of the sewage of the City, by the Bay of Nigg, to Girdleness is now nearing completion, and will do much to prevent pollution of the waters in the estuary of the Dee. It is greatly to be desired that the Don should receive as much attention from all concerned in its pollution. There are few rivers more beautiful in their lower reaches than the Don. Its banks are a favourite resort of many of the citizens, and the famed Brig of Balgownie is visited by almost every stranger. Yet I doubt if there is any river in Scotland, with the exception of the Clyde, that exhibits grosser and more visible pollution. At low tide, in warm weather, it is impossible to cross the bridges near the mouth of the Don without inhaling the putrid odours from the uncovered slime. In so far as the pollution proceeds from the sewage of Woodside, I understand that the scheme of the Town Council for intercepting this sewage by a main sewer, and conveying it into the general drainage of the City, will soon be undertaken. But the worst offenders are the large mills, chiefly paper mills, on the banks of the river. Few would desire to make such demands on the owners of the mills as would imperil the continuance in Aberdeen of the important industries which they represent, but experience in many parts of the country with mills of a similar kind shows that much can be done to purify the mill effluents without incurring any intolerable expense. I am informed that in certain of the mills,

Table XII.

CITY HOSPITAL.—ANNUAL SUMMARY, 1904.

Zymotic Admissions and Deaths during each Year from 1894 to 1904 inclusive.

Disease.		1904	1903	1902	1901	1900	1899	1898	1897	1896	1895	1894	1894-1903. Total	1894-1903. Annual Average
Small Pox,	Admitted, ...	3	0	0	7	0	2	0	0	0	1	4	14	1·4
	Died, ...	0	0	0	1	0	0	0	0	0	0	1	2	0·2
	Percent. of Deaths to Admissions, ...	0	*0*	*0*	*14·7*	*0*	*0*	*0*	*0*	*0*	*0*	*25·0*	...	14·3
Measles, ...	Admitted, ...	72	78	156	133	342	191	194	129	266	40	125	1654	165·4
	Died, ...	1	9	3	4	9	4	7	0	4	0	1	41	4·1
	Percent. of Deaths to Admissions, ...	1·4	*11·5*	*1·9*	*3·0*	*2·6*	*2·1*	*3·6*	*0*	*1·5*	*0*	*0·8*	...	2·5
Scarlet Fever, ...	Admitted, ...	534	408	278	340	280	343	920	842	1181	456	334	5382	538·2
	Died, ...	16	9	8	5	7	16	28	16	29	17	15	150	15·0
	Percent. of Deaths to Admissions, ...	3·0	*2·2*	*2·9*	*1·5*	*2·5*	*4·7*	*3·0*	*1·9*	*2·5*	*3·7*	*4·5*	...	2·8
Diphtheria,	Admitted, ...	131	120	107	101	82	78	79	26	35	20	24	672	67·2
	Died, ...	9	8	8	5	6	8	4	2	2	2	3	48	4·8
	Percent. of Deaths to Admissions, ...	6·9	*6·7*	*7·5*	*4·9*	*7·3*	*10·3*	*5·0*	*7·7*	*5·7*	*10·0*	*12·5*	...	7·1
†Typhoid Fever, ...	Admitted, ...	24	22	28	70	26	35	18	0	0	8	4	211	21·1
	Died, ...	2	0	1	1	2	6	2	0	0	1	1	14	1·4
	Percent. of Deaths to Admissions, ...	8·3	*0*	*3·6*	*1·4*	*7·7*	*17·1*	*11·0*	*0*	*0*	*12·5*	*25·0*	...	6·6
Typhus Fever, ...	Admitted, ...	22	0	0	0	0	5	5	0	0	0	1	11	1·1
	Died, ...	1	0	0	0	0	0	2	0	0	0	0	2	0·2
	Percent. of Deaths to Admissions, ...	4·5	*0*	*0*	*0*	*0*	*0*	*40·0*	*0*	*0*	*0*	*0*	...	18·2
Other Zymotics,	Admitted, ...	29	17	32	18	14	10	12	4	1	2	3	113	11·3
	Died, ...	4	2	3	1	2	1	1	0	0	0	1	11	1·1
	Percent. of Deaths to Admissions, ...	13·8	*11·8*	*9·4*	*5·6*	*14·3*	*10·0*	*8·3*	*0*	*0*	*0*	*33·3*	...	9·7
Total Zymotics,	Admitted, ...	815	645	601	669	744	664	1228	1001	1483	527	495	8057	805·7
	Died, ...	33	28	23	17	26	35	44	18	35	20	22	268	26·8
	Percent. of Deaths to Admissions, ..	4·0	*4·3*	*3·8*	*2·5*	*3·5*	*5·3*	*3·6*	*1·8*	*2·4*	*3·8*	*4·4*	...	3·3
Quarantine,	Admitted, ...	25	14	6	43	18	22	34	16	23	15	31	222	22·2
	Died, ...	3	3	0	0	0	0	0	1	1	2	0	7	0·7
	Percent. of Deaths to Admissions, ...	12·0	*21·4*	*0*	*0*	*0*	*0*	*0*	*6·2*	*4·3*	*13·3*	*0*	...	3·2

† Some cases of Typhoid Fever occurring in the City are removed to the Royal Infirmary or Sick Children's Hospital for treatment.

and mainly at the instance of the County Council, steps are being taken to obtain a less objectionable effluent, but there is no evidence as yet of any practical outcome. I would suggest that now, since the Town Council, by its drainage scheme for Woodside, is about to remove itself from the category of offenders, it should join hands with the County Council in the effort to restore the waters of this fine river to something of their natural purity and beauty.

CITY HOSPITAL.

(Table XII.)

No additions were made to the Hospital during the year. The number of admissions (840) was slightly above the average of the preceding decade, namely, by 12. There was no difficulty at any time in finding accommodation for all the cases. The chief defect, as I have mentioned before, is the absence of a reception house for contacts or suspects. During the outbreak of typhus there were as many as 66 contacts in the Hospital at one time, and accommodation was found for them in two of the ordinary pavilions, both of which had to be specially cleared of their ordinary inmates. Luckily, there was no pressure from other zymotics at the time, and no great difficulty was felt in dealing with the situation.

The accompanying table gives a summary of all the cases admitted to the City Hospital during the year, together with a corresponding summary for each of the preceding ten years. It shows that, as usual, the majority of the cases—534, or nearly two thirds—were cases of scarlet fever. Diphtheria came next with 131 cases. Then followed measles with 72 cases, typhoid fever with 24, typhus fever with 22, and small-pox with 3.

The proportion of the notified cases admitted to the City Hospital, or other public hospital, was, for scarlet fever, 91 per cent. ; for diphtheria, 81 per cent. ; for measles, 3·6 per cent. ; for typhoid fever, 76 per cent. ; and for small-pox, 100 per cent.

The case mortality among the scarlet fever cases admitted to hospital was 3·0 per cent., or slightly above the average (2·8) for the preceding decade. The case mortality among the diphtheria cases was 6·9 per cent., which is slightly under the rate (7·1) for the previous ten years. The mortality might have been considerably lower had the cases been sooner notified and removed to hospital, so as to obtain the benefit of an earlier treatment with antitoxin. Some of the cases admitted were moribund on admission. The case mortality among the measles cases treated in hospital was 1·4 per cent., as compared with an average of 2·5 per cent. in previous years. Among those not removed to hospital it was 5·1 per cent. The case mortality among the typhoid cases was 8·3 per cent., which is above the average (6·6) for the preceding decade. The case mortality among the typhus cases—the cases removed to hospital in the last week of the year—was 4·5 per cent. as at the end of the year. There was no death among the three small-pox cases.

The 29 cases of "other zymotics" referred to in Table XII. consisted chiefly of cases of erysipelas, with a few cases of whooping cough.

MATTHEW HAY, M.D.,
Medical Officer of Health.

Aberdeen, 31*st July*, 1905.

APPENDIX.

(I.)

ABERDEEN SCHOOL BOARD.

Suggestions for the Medical Inspection of Schools.

WORK OF INSPECTION.

(1). A general medical examination by a Medical Inspector of every child on first admission to school, such conditions being especially noted as would require medical attention, either for the promotion of the child's health and fitness for school life, or for the protection of other children, as in case of skin diseases.

(2). The examination by a Medical Inspector of any child, or of a class or a department, at any time when considered necessary, or when desired by the Head Teacher or Health Committee. Such examinations would deal, for example, with difficulties of sight or hearing, and with suspected illness, especially infectious illness, as also with doubtful fitness for physical training. In cases of absence from school, where illness is alleged but where no satisfactory medical certificate is presented, the Medical Inspector to visit the child and report the cause of absence to the Headmaster.

(3). The examination of children on first admission to be made as soon as practicable after such admission, taking the children in such order as they may be presented by the Headmaster, who will see that those who appear to be most needful of medical examination are presented first. The result of the examination to be noted (using, for economy of time and space, special abbreviations) on a card or physical register prepared by the Health Committee, which card should be filed and preserved by the Headmaster, and used for receiving any notes of subsequent examinations. In filling in these cards, especially at the commencement of a session, when the number of children to be examined is large, the Headmaster to endeavour to provide clerical assistance to the Inspector.

(4). Where a child, whether on first admission or at any subsequent period, is found, on medical inspection, to be suffering from a physical defect or from a disease or condition requiring medical attention, the Medical Inspector to send a note of such defect or condition to the parents, unless he is satisfied that it is already being properly attended to. Such condition to be also brought under the notice of the Headmaster, who shall inform the Medical Inspector later on if he is of opinion that the condition is being neglected, when the Medical Inspector may, if he thinks fit, visit the parents. The Medical Inspector in no case to undertake the medical treatment of a child, except where the child is already a patient in his private practice.

(5). The Medical Inspector to be empowered to exclude from school any child suffering from an infectious disease, unless satisfied that the child is being so treated that the infection is not likely to spread.

(6). The Medical Inspector to advise the Headmaster as to any child whom he may regard as unfit, on account of certain defects or ill health, to undertake with advantage the full school curriculum.

(7). The Medical Inspector to visit periodically each school under his charge, say, every second week during the session, and at any other time when required by the Headmaster ; and his visits and inspections to be always so arranged as to suit the convenience of the school as ascertained from the Headmaster.

(8). The Medical Inspector at each periodical visit to observe the condition of the ventilation in the school, and if defective to inform the Headmaster accordingly. To observe also the state of cleanliness of the school generally, and of the appliances, such as wash-basins, towels, latrines, and also of the air-ducts, and to report, if necessary, on same to Headmaster.

(9). Also to note at each periodical visit any fault in the posture of the children or other defect during instruction, likely to injure the health of the children, and to report same to the Headmaster.

(10). To preserve a record or log-book of all his observations, which shall be available for the inspection of the Chief Medical Inspector, or the Clerk of the School Board, or any Member of the Health Committee.

(11). The Chief Medical Inspector to co-ordinate the work of the various District Inspectors, to visit each school at least once a quarter, and to prepare an annual report to the Health Committee on the medical inspection of all the schools under the Board. The District Inspector to be required to send such reports to the Chief Inspector as he or the Health Committee may require.

(12). The Medical Inspectors to examine medically all Teachers and Pupil Teachers before admission to the service of the Board, and at such times after admission as the Board or the Health Committee may require.

(13). The Teachers to take such measurements of each child as the Health Committee may require, and to enter them in the Physical Register Card of the child. The minimum of the measurements might consist of height and weight, but facilities should be given in selected schools for adding other measurements.

(14). The Teachers to be also requested to note habitual want of cleanliness in any child, or insufficiency of clothing, or under-feeding, and to hand the name of the child to the Female Visitor, who would visit the house of the parents ; but, unless the facts are well known, no case of supposed under-feeding to be so dealt with until the child has been examined by a Medical Inspector to see that the emaciation is not due to illness.

The Health Committee to consider what directions should be given to the Female Visitor in dealing with cases of insufficient clothing, or of under-feeding.

ADMINISTRATION AND EXECUTIVE.

(1). The School Board, while remaining the supreme authority, to appoint annually a Health Committee, with full powers to supervise the health of the children and the means to be employed in maintaining or improving it, but to incur no expenditure without the previous sanction of the Board. The Committee to submit to the Board, at least once a year, an account of their work.

(2). The Health Committee to consist of, say, seven or nine Members of the Board, with, in addition, say, five medical men of experience as Assessors or Advisers, invited or appointed by the

Board to represent the following branches of medicine :—(1) Pure medicine, (2) surgery, (3) eye diseases, (4) children's diseases, (5) hygiene. The last should be represented *ex officio* by the Medical Officer of Health. A representative of physical training might also be added. Each added member of the Committee to receive for their advisory services a yearly honorarium of, say, 20 guineas, or a fee of £2 2s. for each meeting attended.

(3). The Health Committee to appoint and control the Executive Staff.

(4). The Executive Staff to consist of :—*(a)* One District Medical Inspector for, say, every two schools or every 1,500 to 2,000 children, whose yearly remuneration might be at the rate of £2 for every 100 children, or fraction of 100, enrolled in the schools under his charge ; *(b)* a Chief Medical Inspector, who shall also act as one of the District Inspectors, and receive a salary of, say, £100 to £120 in addition to his remuneration as a District Inspector. Every Inspector to be qualified, as attested by special certificate, to examine eyes. It would be an advantage if the Chief Inspector held also a public health qualification. All the Medical Inspectors to be permitted to engage in private practice. *(c)* A Female Visitor, at a salary of, say, £70 to £80, preferably with previous experience of similar duties, or of those of a Female Sanitary Inspector or District Nurse. As the scheme would be tentative, all appointments should be held during the pleasure of the Board.

If such a scheme as the above were to be adopted by the Board, it would, of course, be proper to begin with the appointment of the Health Committee, and leave it to determine, subject to the approval of the Board, the precise form of the remainder of the scheme.

MATTHEW HAY.

5th March, 1904.

(II.)

Instructions for Preventing the Spread of Consumption.

1. **Consumption is infectious.** It is spread by **germs,** which are found in the **sputum** or spit of persons suffering from consumption.

2. The **germs** may **remain alive for weeks** in the **sputum,** even when **dried.**

3. It is **chiefly through** the **sputum** that **other persons** become **infected,** either (*a*) by contact with the **moist sputum,** as in lip-contact, using eating utensils in common, or standing over or in front of the patient when coughing, or (*b*) by inhalation of the **dried sputum** in the form of dust.

4 It is believed that a person already suffering from the disease may hasten its spread in his own lungs by the inhalation of dust containing his dried sputum.

5. It is **important,** therefore, that the **sputum** and **coughed-up material** of infected persons should be **collected,** and **destroyed** or **disinfected.**

6. **Spitting** on the **floors** of rooms, workshops, tram cars, railway carriages, cabs, or on **streets** or highways, or other occupied or frequented places, **must be avoided.** The sputum will dry, and may be inhaled as dust by healthy persons.

7. For **receiving** the **sputum,** when the patient is in-doors, a **cup** or mug, containing a little water or disinfectant solution, may be used ; and, when out-doors, a small, bottle-shaped **pocket spittoon,** obtainable from a chemist. Such **mugs** or **spittoons** should be **cleansed** at least **once a day,** by mixing the contents with *boiling* water, or preferably with disinfectant solution, and emptying into a water-closet or slop-pail (not into a sink), and should be well rinsed with boiling water or disinfectant solution.

8. **Handkerchiefs,** if used for receiving sputum, must be carried in a **pocket containing nothing else,** and lined with glazed, water-proof material, which should be frequently sponged with disinfectant solution. The **handkerchief** should, **on no account,** be **in use for longer than one day,** otherwise the sputum on the handkerchief will next day have dried, and be detachable as dust. Handkerchiefs should be placed in disinfectant solution overnight, before being washed. Rag or paper handkerchiefs may be used, and burned at the close of the day.

9. A **separate set** of **eating utensils**—spoons, knives, forks, cups, and tumblers—should be kept for the **sole use** of the **patient,** and should be **separately washed.** Ordinary washing does not remove all the germs from the surface of eating utensils, hence the need for a separate set.

10. As the **bed-clothing** of the patient tends to become infected, the **pillow-covers** and **sheets** should be **changed every week,** and boiled in course of washing ; and the **blankets** should be **washed once a month,** after being steeped for two hours in disinfectant solution.

11. The **rooms occupied by** the **patient** sho thoroughly **cleaned every day.** To avoid raising which may carry infection, the furniture should be d with a **damp cloth,** and the **floor** and **woodwork** s be **washed every week.** If carpeted, the floor, being swept, should be sprinkled with wet tea l Carpet sweepers which collect the dust in the co sweeping are preferable to ordinary brushes. All the should be **burned.**

12. The patient should have a **separate bed,** and also, if practicable, have a **separate bedroom.**

13. The **bedroom** should be **dry** and **airy,** and vided with a **fire-place,** and should, if possible, fac **sun.**

14. The **furnishings** of the **bedroom** should be and **simple,** so as to allow of the room being thoro and easily cleaned. Thus, bed or window **curtains** ar to be **recommended,** and the **floor** should preferab **bare, or covered with linoleum** or similar material or two small rugs may be used.

15. As a **constant supply** of **fresh air** is all portant in promoting the recovery of the patient, a preventing the infection of others, the **windows** of bed and sitting-room should be kept **constantly** more o **open,** even in winter. In summer the sashes should drawn as to overlap completely at middle of window, le a large opening at top and bottom. **Sunshine** s also be allowed to **enter freely.**

16. The patient should **avoid kissing** others on the

17. **Consumptive mothers** should not suckle children, and consumptive mothers or nurses should in feeding infants, touch the food or the spoon, or th of the feeding-bottle, with their own mouths.

18. The **ordinary breath** of the patient is pro **not infectious ;** but the **air expired in coughing,** charged with droplets of sputum, is **infectious.** patient should always hold a **handkerchief over mouth in coughing,** even when no person is present

19. The **Public Health Department** will gladly in **disinfecting** rooms, bedding, and clothing.

20. When the **patient ceases to occupy** any r or **house, notice** should **forthwith** be **sent** to the P **Health Department,** so that the room or house ma **disinfected** before being occupied by others.

Disinfectant Solution may be prepared by mixing one ou cyllin or izal, or ten ounces of carbolic acid, with 1 gallon (or 6 bottlefuls) of water. Other disinfectants may be used if approved Medical Attendant or Medical Officer of Health.

N.B.—Poorer Patients will receive a supply of disinfectant gratu at the City Hospital, on written recommendation by the Medical Att

MATTHEW HAY, M.D.,
Medical Officer of Heal

(III.)

Measles: Its Prevalence and Mortality in Aberdeen;

By GEORGE N. WILSON, M.D., D.P.H.

The following statistical investigation has been undertaken at the suggestion and under the guidance of the Medical Officer of Health of Aberdeen, who has given me full access to the material.

Measles is probably the most universal of human zymotics in this country, and, as the case mortality, though greatly less than that of some more dreaded zymotics, is not inconsiderable, the total number of deaths in the course of years is so great as to demand for the disease a foremost place in the consideration of hygienists, and of the community.

In Aberdeen, within the last ten years, measles caused more deaths than any other single zymotic, and even more than all the other zymotics taken together, if whooping cough be excluded.

The compulsory notification of measles has, as yet, been tried in only a few towns, of which Aberdeen is one, and as the data obtainable from such notification have not yet anywhere, so far as I am aware, been fully tabulated and analysed, I have undertaken this task for the City of Aberdeen in hope that the results, which have been worked out with all proper care, may be of permanent value.

As early as 1881 the Corporation of Aberdeen obtained powers to compel the notification of infectious diseases, including measles and whooping cough.

Under the Aberdeen local act of 1881, notification by the medical attendant only was required. After the passing of the Infectious Disease (Notification) Act, 1889, the Town Council adopted it in 1891, in order to obtain the advantage of dual notification—that is, by the medical attendant and by the householder. After a report from the Medical Officer of Health, the compulsory notification of measles and whooping cough was stopped in February, 1903, as experience appeared to show that the benefits scarcely justified the large cost.

There has thus been a continuous notification in Aberdeen of all cases of measles since the end of 1881 to the beginning of 1903.

I purpose dealing with the material obtainable for the twenty years 1883 to 1902, inclusive, and on similar lines to a paper on Whooping Cough in Aberdeen, prepared by the late Dr. James S. Laing, in 1902. No doubt a question may arise as to the completeness of the record of cases of measles during these years. It must be admitted that the notification of any disease is rarely absolutely complete. Some cases are unrecognised, and others may be wilfully concealed. The Aberdeen records cannot, therefore, pretend to scientific completeness, but they represent every case brought to the notice of the Medical Officer of Health and his staff, under a system of compulsory notification, with a penalty for failure. And it may be added that the compulsory powers were rigidly applied throughout the whole period, prosecution having, when required, been instituted against defaulters.

POPULATION OF ABERDEEN.

As the cases and deaths are for the most part calculated in relation to the population of the City, so as to eliminate any possible error which may arise from the growth of the population not being sufficiently kept in view, I may state that I have adopted for each year the population given by the Registrar General in his returns, though modifying it in certain instances where the revelations of a subsequent census rendered modification necessary. The population of Aberdeen in 1881 was 105,538; in 1891, 123,348; and in 1901, 154,295. In the first half of the twenty years to which this investigation applies, the average population was 117,011, and in the second half 143,039.

ATTACK-INCIDENCE (MORBIDITY) OF MEASLES.

I.—In respect of Time and Season.
II.—In respect of Age and Sex.
III.—Second Attacks.
IV.—Comparison with Whooping Cough.

I.—In respect of Time and Season.

A. Time.

(Table I. ; Chart I.)

From the commencement of 1883 until the end of 1902, there were notified in Aberdeen 40,374 cases of measles (see Table I.) which were divided between the sexes as follows :—

Males, ...	20,287
Females, ...	20,087

For the two halves of the period the figures were :—

First half (1883 to 1892)	Males, . .	8,152	16,120
	Females, . .	7,968	
Second half (1893 to 1902)	Males, . .	12,135	24,254
	Females, . .	12,119	

These figures show a large increase of cases in the second decennial period ; and, even after allowance has been made for the considerable growth of population, it is evident that measles was more prevalent in the later than in the earlier decennium. Perhaps it was to some extent more apparent than real from an increasing thoroughness in notification. Even if this should be so, it does not greatly modify the chief conclusions to be drawn from my statistical inquiry.

Chart I. shows in graphic form the monthly attack incidence of measles from 1883 to 1902, the cases being calculated per 100,000 of population. The peaks indicate the times of highest prevalence, and the troughs the periods or intervals of quiescence. The upright lines mark off the commencement of each year, and the dots represent each month of the year.

It will be observed that the height of the highest peak in an epidemic does not always indicate the extent or mass of the epidemic. Some epidemics rise quickly to a great height, and fall as quickly, while others, which do not rise so high, cover a longer period of time—*e.g.*, the epidemic of 1892 attained the giant height of 1,613 per 100,000 of population in three months, and fell almost to zero in four months, thus covering a period of seven months, whereas the epidemic of 1900 rose to 694 per 100,000 of population in two months, but took eleven months to fall to zero. The epidemic of 1900, as a matter of fact, represented more cases than that of 1892. The same is true of a comparison of 1887 and 1884. The epidemic in the latter year, although the lower in height on the chart, represents considerably more notified cases.

In the same chart one notes a marked cyclical change in the epidemic peaks, the tendency of which is obviously biennial. This epidemic periodicity, however, is more strongly marked in the second than the first half. In the latter also the intervals are slightly shorter and more regular than in the former.

The chart also distinctly suggests a periodicity among the epidemic years themselves, a specially high epidemic rise showing itself about every sixth year, or at every third epidemic.

It would also appear as if the longer the interval, the greater is the height attained by the succeeding epidemic wave. This is instanced in the very high epidemic peak of 1892, preceded by a long interval of quiescence, and in the very low wave of 1890, with scarcely any preceding interval. This is precisely what we would expect to find.

It may also be proper to direct attention to the increased numbers notified in the second ten years of the period under discussion, as possibly indicating a third cyclical change in the form of a long-period prevalence wave. Chart XI., which shows graphically the yearly mortality of 100,000 of population for Aberdeen and other large towns for 45 years, also shows evidence of such a cyclical change. This is common to almost all the towns compared in the chart, and may be returned to at a later stage.

Such an imposition of wave upon wave—smaller ones upon larger ones—is what might be expected from physical analogy.

B. Season.

(Table II. ; Chart II.)

In Chart II. is represented the average attack-incidence of measles per 100,000 of population

Table I.

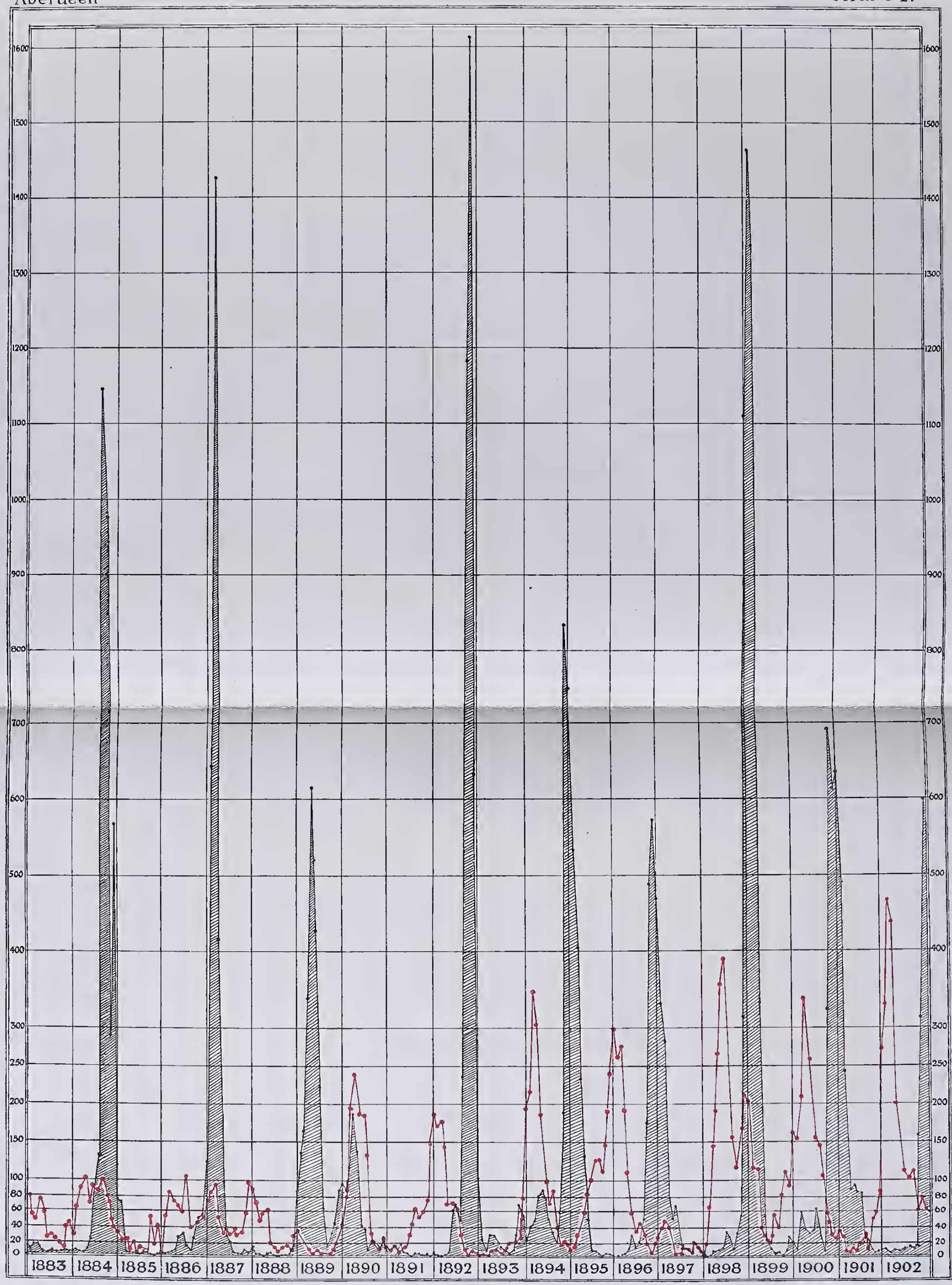
MEASLES.-Cases Notified and Deaths Registered in each year in Aberdeen from 1883 to 1902

DISTINGUISHING SEX AND AGE.

		Quarters of First Year.								AGE																															
		1st Qrt.		2nd Qrt.		3rd Qrt.		4th Qrt.		-1		-2		-3		-4		-5		-6		-7		-8		-9		-10		-11		-12		-13		-14		-15		-25		-60		60+		Total		Total
		M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	BOTH SEXES
1883	Cases	2	-	5	2	2	-	-	1	9	3	2	3	3	6	2	4	6	5	2	5	2	-	1	2	1	6	1	2	5	-	2	-	1	4	1	-	4	3	5	7	1	4	1	-	49	54	103
	Deaths	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
1884	Cases	10	10	36	30	67	41	45	40	158	130	213	230	226	247	212	225	231	203	245	218	218	158	159	157	81	73	26	42	21	20	13	12	7	5	5	5	4	5	35	25	8	9	-	-	1862	1761	3623
	Deaths	3	1	1	7	7	4	6	5	17	17	22	19	6	4	-	2	-	1	-	-	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	48	47	95
1885	Cases	-	1	2	3	9	2	1	1	12	7	18	16	16	6	15	7	12	10	3	5	5	11	6	3	4	5	5	2	3	1	2	-	3	1	1	-	2	-	4	8	-	1	-	-	111	83	194
	Deaths	-	-	1	1	1	-	-	-	2	1	-	2	1	4	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	3	9	12
1886	Cases	1	1	3	2	2	4	1	2	7	9	20	15	20	15	8	16	17	16	15	19	9	14	10	17	4	5	4	-	2	2	3	1	1	3	1	1	-	1	6	7	2	4	-	-	129	145	274
	Deaths	-	-	-	1	-	2	-	1	-	4	-	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	8	11
1887	Cases	6	10	26	27	61	67	37	41	130	145	256	254	256	236	201	197	197	194	194	158	160	144	100	106	50	36	28	24	11	23	7	10	7	3	2	8	5	9	20	31	10	10	-	-	1634	1588	3222
	Deaths	1	1	4	2	18	16	14	6	37	25	63	50	28	20	10	11	3	3	5	6	2	3	2	3	2	-	-	-	1	-	-	-	-	-	-	1	-	-	-	2	-	1	-	-	153	125	278
1888	Cases	-	1	1	-	1	1	-	1	3	2	-	3	2	-	-	2	2	-	2	1	-	5	2	-	1	2	-	3	1	-	1	1	-	1	-	-	-	1	5	2	2	2	-	-	21	27	48
	Deaths	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
1889	Cases	9	13	33	21	54	41	18	32	114	107	161	202	171	158	126	164	176	153	120	139	155	167	98	120	45	49	17	32	13	27	7	18	9	14	11	10	5	9	20	27	14	14	-	-	1262	1410	2672
	Deaths	1	1	1	1	16	8	6	7	24	17	28	28	8	13	3	5	-	2	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67	67	134
1890	Cases	2	1	12	11	20	15	9	12	43	39	79	59	63	71	58	46	52	60	71	63	44	51	23	26	12	10	6	19	6	4	6	2	3	7	5	3	4	6	11	17	3	8	-	-	489	491	980
	Deaths	1	-	2	-	2	1	5	8	10	9	7	6	1	7	1	3	2	1	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	23	29	52
1891	Cases	1	2	3	-	2	1	1	-	7	3	3	-	3	5	6	3	3	1	5	5	2	3	1	1	-	2	-	2	1	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	32	27	59
	Deaths	1	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
1892	Cases	9	9	36	26	71	60	36	57	152	152	333	256	319	237	299	335	284	264	363	352	305	262	215	236	105	106	58	54	30	26	11	18	18	18	10	9	13	8	39	32	10	15	1	-	2563	2382	4945
	Deaths	-	2	6	1	13	12	6	10	25	25	34	21	13	8	3	4	2	-	1	4	2	1	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	81	64	145
1893	Cases	2	3	6	5	8	5	5	3	21	16	33	41	37	28	26	40	26	26	31	32	16	15	8	18	10	10	6	5	3	6	6	4	-	2	1	1	1	-	2	10	7	4	-	-	235	259	494
	Deaths	1	-	1	1	1	-	-	-	3	1	6	5	-	-	1	2	2	-	1	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	10	23
1894	Cases	5	5	14	9	25	31	29	16	73	61	119	131	124	106	117	146	114	110	149	149	152	155	89	84	28	32	16	13	7	11	2	3	3	2	2	2	5	5	7	7	5	8	1	-	1013	1025	2038
	Deaths	2	-	3	1	4	4	4	2	13	7	11	11	5	3	4	2	5	1	1	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	26	66
1895	Cases	12	7	33	23	48	59	45	40	138	129	236	221	216	219	178	190	197	184	193	176	130	113	79	61	35	22	13	21	7	10	2	7	5	8	4	6	1	5	14	17	10	16	-	-	1458	1405	2863
	Deaths	-	-	5	3	12	15	10	12	27	30	37	33	17	9	5	5	5	3	4	2	-	-	-	2	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	96	85	181
1896	Cases	5	9	11	22	26	20	13	16	55	67	69	94	87	102	115	124	113	114	166	124	170	175	64	80	20	25	6	17	8	7	7	6	3	13	4	2	3	4	14	21	5	10	-	-	929	985	1914
	Deaths	-	-	3	-	4	-	5	-	12	-	5	7	-	-	1	-	-	2	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	9	29
1897	Cases	3	4	19	14	22	30	22	17	66	65	94	116	109	132	120	118	103	112	117	116	114	107	55	81	32	41	19	15	10	19	11	9	6	12	5	6	2	8	19	31	4	5	2	-	888	993	1881
	Deaths	-	-	1	2	2	3	2	3	5	8	2	5	-	1	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	15	24
1898	Cases	3	-	6	6	8	11	4	9	21	26	49	50	37	44	41	40	42	36	44	52	67	44	18	32	15	23	8	11	4	4	2	1	-	1	3	2	-	-	6	5	2	3	-	-	359	374	733
	Deaths	-	-	2	-	2	2	-	1	4	3	6	3	-	2	-	-	1	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	10	21
1899	Cases	15	20	55	53	101	98	81	79	252	250	428	415	463	449	441	469	431	430	457	386	314	299	170	204	89	83	60	39	24	32	24	17	17	22	11	21	12	7	87	53	24	22	1	-	3305	3188	6493
	Deaths	1	-	3	4	9	8	9	14	22	26	33	26	8	3	2	5	-	3	2	1	-	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67	67	134
1900	Cases	10	10	29	19	69	37	28	26	125	93	211	192	181	194	198	210	211	170	251	255	194	198	76	84	20	24	18	11	18	5	7	7	5	8	3	5	1	3	29	31	9	5	-	-	1557	1495	3052
	Deaths	-	-	2	2	2	3	4	3	8	8	13	9	5	3	2	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	31	25	56
1901	Cases	11	7	17	20	53	46	27	33	108	106	197	173	206	188	161	170	171	162	158	180	157	136	82	83	44	58	20	25	11	13	7	17	12	7	2	12	4	7	29	47	14	19	-	1	1383	1406	2789
	Deaths	1	1	1	1	3	6	4	8	9	16	16	10	2	3	1	1	-	2	-	-	1	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29	34	63
1902	Cases	9	7	11	14	30	25	15	19	65	65	102	106	112	101	108	123	103	93	172	159	186	174	84	83	28	22	10	14	9	2	4	2	5	5	3	2	1	1	10	20	6	17	-	-	1008	989	1997
	Deaths	1	-	-	-	3	2	2	-	6	2	5	1	-	1	-	1	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	6	18
TOTAL MALES	Cases	115		358		669		417		1559		2643		2651		2434		2489		2758		2400		1340		624		321		194		124		105		74		67		363		136		6		20287		
	Deaths	13		36		100		77		226		288		96		37		23		18		9		4		2		1		1		-		-		1		-		2		1		-		709		
TOTAL FEMALES	Cases	129		307		594		445		1475		2579		2544		2619		2347		2594		2228		1478		634		351		212		135		136		95		83		399		176		1		20087		
	Deaths	6		28		86		80		200		238		82		45		20		17		12		10		3		3		-		-		-		1		-		5		1		-		637		
TOTAL	Cases	244		665		1263		862		3034		5222		5195		5053		4836		5352		4628		2818		1258		672		406		259		241		169		150		762		312		7		40374		
	Deaths	19		64		186		157		426		526		178		82		43		35		21		14		5		4		1		-		-		2		-		7		2		1		1346		
PERCENTAGE OF POPN LIVING AT EACH AGE	M.									1·42		1·20		1·26		1·28		1·26		1·22		1·24		1·15		1·14		1·13		1·16		1·11		1·17		1·13		1·12		9·50		15·55		3·02		60170		
	F.									1·24		1·14		1·07		1·17		1·20		1·16		1·12		1·14		1·16		1·08		1·14		1·12		1·10		1·06		1·10		11·50		20·22		5·22		69830		

Aberdeen

Chart I.

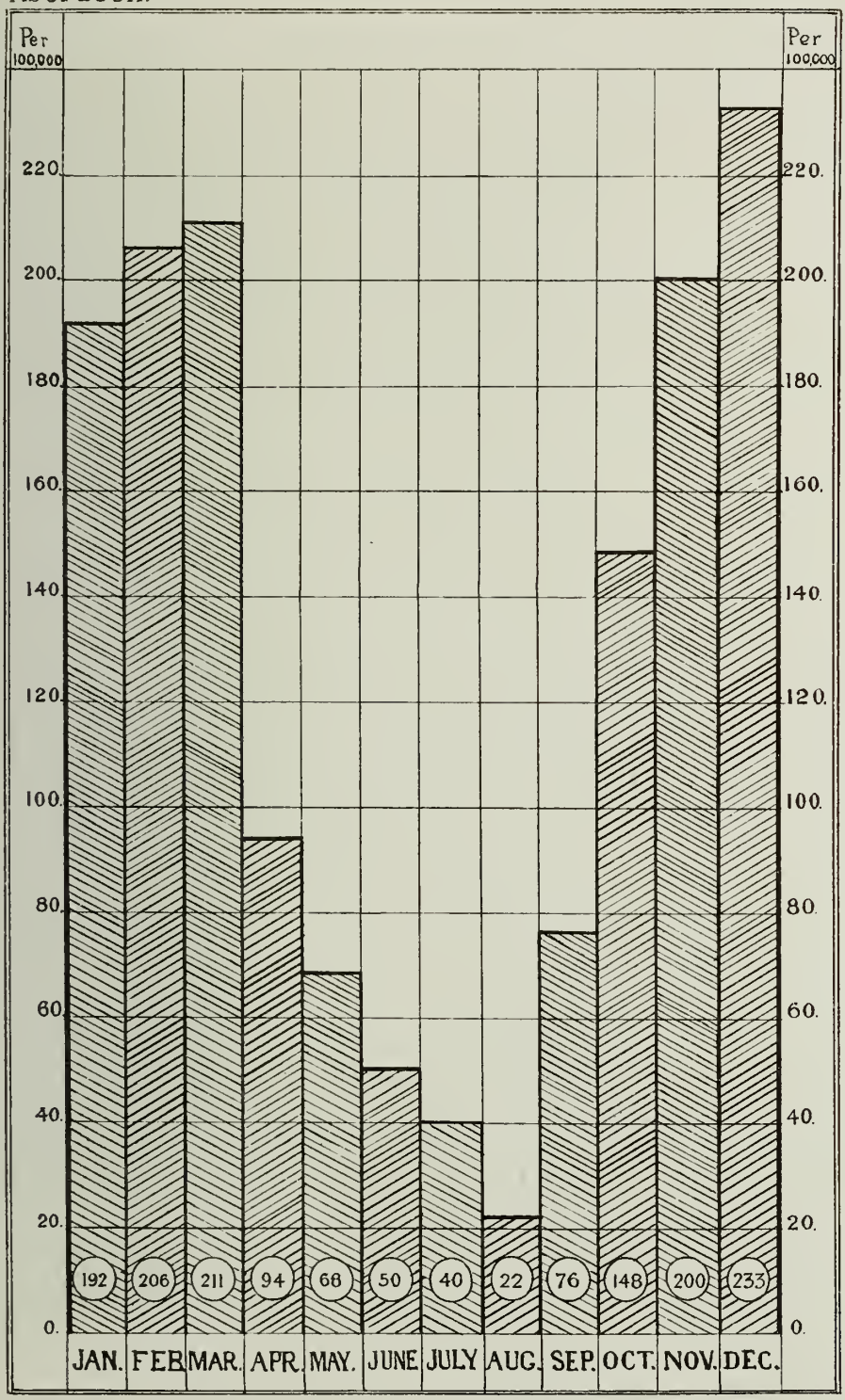


MEASLES~ Monthly Attack-Incidence of **MEASLES** and **WHOOPING COUGH** from 1883 to 1902.
(per 100,000 of Population.)

MEASLES:- Cases and Deaths in each month in Aberdeen.(1883-1902)
(PER 100,000 OF POPULATION.).

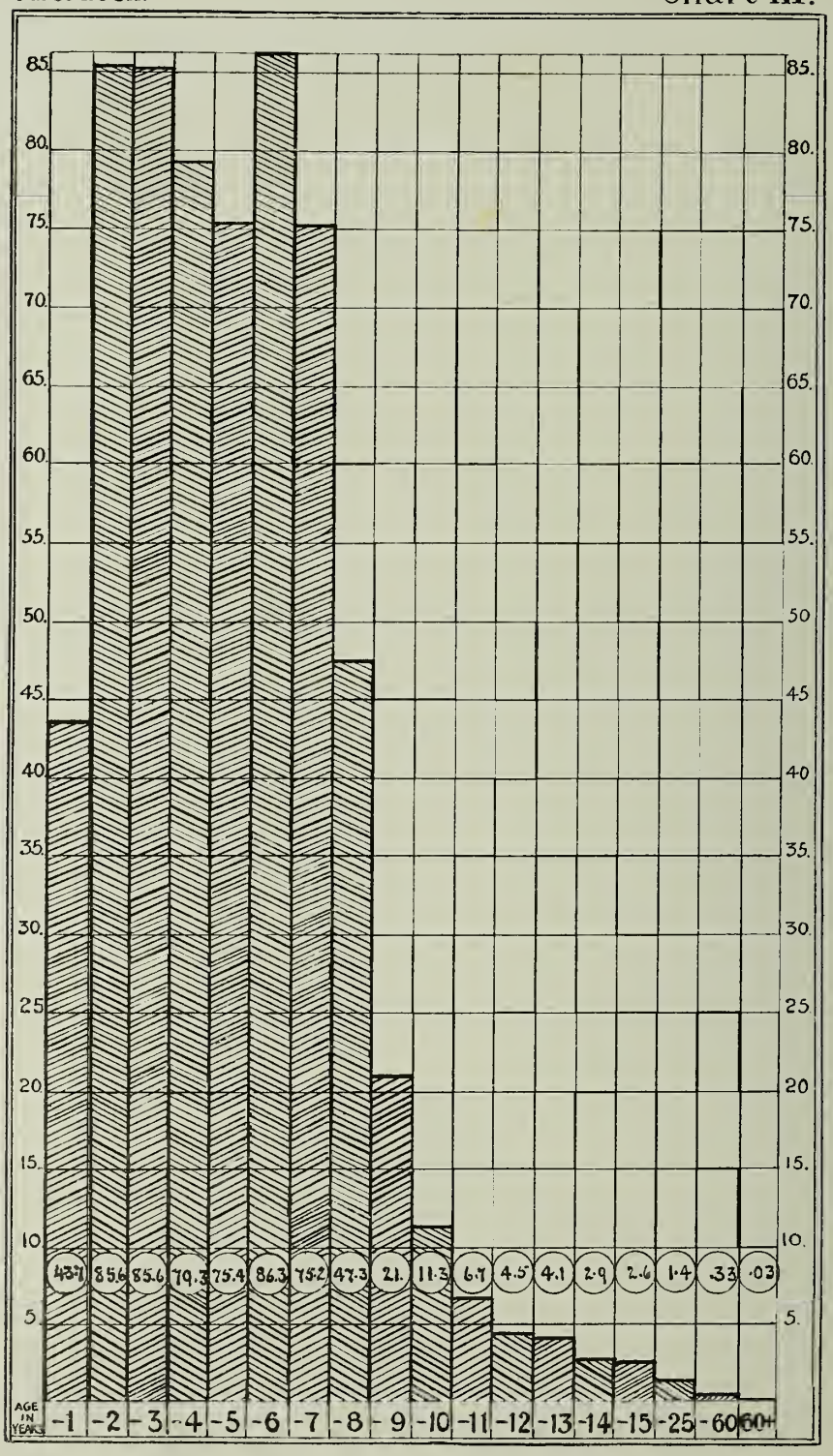
	PER 100,000	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902
JAN.	Cases	14.6	5.4	78.6	1.7	125.4	11.9	87.4	97.	8.1	2.3	102.7	22.	749.4	.72	470.6	3.4	1108.1	21.1	635.5	8.8
	Deaths	–	–	5	–	4	–	–	4	1	1	10	–	50	–	5	1	25	–	25	–
FEB.	Cases	9.1	7.1	73.3	1.7	644.4	1.7	138.7	89.6	2.4	.78	23.9	40.2	537.7	.72	333.5	–	1165.1	12.5	493.5	12.
	Deaths	–	–	4	–	34	–	2	4	–	–	1	1	43	–	8	–	33	–	21	–
MAR.	Cases	16.4	4.5	4.4	2.6	1427.3	1.7	164.	117.7	5.7	–	8.5	47.1	402.3	2.1	284.8	.69	1340.	59.5	245.1	3.1
	Deaths	–	–	–	–	137	–	3	6	–	–	4	2	46	–	4	–	45	–	8	–
APR.	Cases	16.4	1.8	1.7	4.3	418.6	–	341.4	189.	18.8	.78	30.8	80.5	237.	2.8	79.8	4.1	334.6	39.	90.1	8.2
	Deaths	–	–	–	–	73	–	8	13	–	–	1	6	23	–	5	–	20	–	3	–
MAY	Cases	11.8	9.	1.7	9.6	99.4	1.7	615.6	140.	4.	4.6	30.1	88.1	133.8	13.	53.	6.9	53.4	34.4	94.6	7.6
	Deaths	–	–	1	2	24	–	26	11	–	1	1	2	10	–	–	–	8	1	3	–
JUNE	Cases	4.5	26.	1.7	27.2	29.4	2.5	430.6	41.3	2.4	60.4	15.4	77.5	50.8	31.8	67.8	12.4	24.3	37.	86.9	9.5
	Deaths	–	–	–	–	3	–	31	1	1	–	–	2	3	–	2	–	–	–	–	–
JULY	Cases	1.8	89.	.85	31.6	20.7	.85	224.5	39.8	–	90.2	6.1	51.6	11.9	15.1	19.	35.2	12.1	62.2	85.6	15.8
	Deaths	1	5	1	–	2	–	30	4	–	8	–	1	5	–	–	–	1	1	1	–
AUG.	Cases	4.5	134.	3.4	14.9	5.1	–	62.2	9.9	2.4	49.4	2.3	34.1	8.9	21.6	8.4.	28.6	2.	31.7	26.5	13.3
	Deaths	–	4	–	1	–	–	9	2	–	5	–	5	–	–	–	–	–	2	–	–
SEP.	Cases	2.7	1143.	2.6	8.7	1.7	.85	17.6	22.3	1.6	239.4	8.5	21.2	2.2	52.7	4.2	11.5	4.	8.6	25.9	16.5
	Deaths	–	3	1	–	–	–	2	3	–	4	–	3	–	–	–	1	–	1	1	–
OCT.	Cases	2.7	975.7	.85	26.3	1.7	.85	32.8	15.7	81	1184.4	30.8	59.2	.74	178.2	2 1	33.1	.07	326.9	12.3	160.
	Deaths	–	34	–	1	–	–	16	1	–	31	–	–	1	4	–	2	–	6	–	2
NOV.	Cases	6.4	292.2	–	54.4	9.5	1.7	43.7	11.6	1.6	1613.	68.	190.7	3.7	488.7	2.8	55.9	10.1	694.9	5.1	313.5
	Deaths	–	29	–	5	–	1	4	–	–	67	3	5	–	9	–	6.	1	20	1	7
DEC.	Cases	2.7	570.1	1.7	57.	3.4	17.3	88.3	38.1	–	635.9	54.	835.8	1.49	575.5	2.8	315.1	28.3	614.1	7.1	599.
	Deaths	–	20	–	2	1	–	3	3	–	28	3	39	–	16	–	11	1	25	–	9
ESTIMATED POPULATION		109307	111242	113212	113943	115624	117305	118936	120667	122348	127478	129543	131642	133773	138328	141524	144720	147916	151151	154295	157505

Aberdeen. Chart II.



MEASLES.- Number of attacks per 100,000 of Population in each of the twelve months of the year (average of 20 years -1883-1902)

Aberdeen. Chart III.



MEASLES.- Attacks per 1000 of Population living at each age, (average of 20 years-1883-1902.)

in each of the twelve months of the year, based on the notification returns for the twenty years ending 1902 (see also Table II.).

Measles is a distinctly seasonal disease, and, as will be seen from an examination of Charts I. and II., it generally reaches its highest prevalence in the colder months of the year. This, however, is subject to considerable variation, as Chart I. shows that the epidemic may reach its height as early as September or as late as May.

Looking at the monthly averages represented in Chart II , one observes, besides the general rise in the colder months, two maxima, one—the higher—in December, and the other—the lower—in March, with a very well-marked minimum in August, when the cases are less than one-tenth of the number in December.

If the averages for the months in the first half of the twenty years are alone taken, a decided dip is exhibited in January, but this is not apparent in the second half, as the following table shows :—

Cases of Measles Notified—

In the Ten Years, 1883 to 1892.		In the Ten Years, 1893 to 1902.	
January,	506	January,	4,501
February,	1,127	February,	4,242
March,	2,027	March,	3,473
April,	1,169	April,	1,293
May,	1,065	May,	726
June,	746	June,	589
July,	593	July,	460
August,	333	August,	256
September,	1,645	September,	339
October,	2,690	October,	1,183
November,	2,530	November,	2,682
December,	1,689	December,	4,510

A similar chart for whooping cough to that here given (Chart II.) for measles, accompanied the paper of Dr. James S. Laing, and it may be of interest to note that a comparison of the charts for the two diseases shows that the maximum of prevalence of whooping cough is in April, and the minimum is in September ; that the maximum is only about three times the minimum ; and that the ascent from the minimum to the maximum is slow.

II.—Incidence in respect of Age and Sex.

A. Age (Sexes Combined).

(Table I. ; Chart III.)

Chart III. shows for a period of twenty years the average number of cases of measles notified annually per 1,000 of population living at different ages, the sexes being taken together. The various ages are dealt with individually up to fifteen years. The remaining ages, being of less importance in this connection, are divided into three age-groups, viz. :—fifteen to twenty-five, twenty-five to sixty, and sixty and over.

The incidence of attack is heaviest—and about equally heavy—among children of the sixth, second, and third years of life, being, respectively, 86·3, 85·6, and 85·6 per 1,000 living at these ages. Next in order come children in the fourth year of age, their figure standing at 79·3 per 1,000, followed by children in the fifth and seventh years of age, whose attack rates are, respectively, 75·4 and 75·2. These are the years of large incidence. Next come two years with a moderate incidence, namely, the eighth year of age, with an attack rate of 47·3 per 1,000 living, and the first year with a rate of 43·7 per 1,000.

At a still lower level comes the ninth year, with a rate of 21 per 1,000 living ; and from this to the age of fifteen years, with a rate of 2·6 per 1,000 living, the fall is rapid and in the order of the increase of age. The age group of fifteen to twenty-five years has an attack incidence of 1·4 per 1,000 living ; and only seven cases are notified in twenty years as having occurred in persons over sixty years of age.

The lessening liability to attack in the higher ages is, of course, almost entirely due to so many at those ages being protected by a previous attack in childhood.

The chief conclusion from this chart is that the great bulk of children have before the completion of their eighth year taken measles, at any rate in a town like Aberdeen; and the practical inference is that it is needless in a threatened epidemic of measles to close schools in so far as children above eight years are concerned.

B. Age (Sexes Separate).

(Table I.; Chart IV.)

Chart IV. deals with the attack-incidence of measles at each age, and for the sexes taken separately.

At every age, except the sixth year of age, the liability to attack is greater in females than in males, but the difference is small.

This greater liability to attack in females is most marked in the third and fourth years of age, females having an attack-incidence of 91·1 and 86·1 (at these two ages), and males an incidence of 80·9 and 73·2 per 1,000. At other ages the difference of incidence between the sexes is so slight as to be negligible.

III.—Second Attacks.

The following table of second attacks shows such cases as were notified during the ten years 1893 to 1902. It gives the total number of notified cases, the number of second attacks amongst these, and the proportion of second attacks per 1,000 cases. The number for each sex, and for the sexes combined, is given for all ages, and at different age-periods.

The proportion of second attacks to the total cases rises steadily with the increase of age, up to the age of twenty-five. Thus for the three age-periods of 0-5 years, 5-15 years, and 15 25 years, the figures for the sexes combined are 9·6, 43·8, 98 0 per 1,000 cases, respectively. Above the age of twenty-five years, the figure is 10 per 1,000.

At all the age-groups, except fifteen to twenty-five, females suffer more frequently than males from second attacks. This is also the case at "all ages", where the rate for females is 28·5 per 1,000 cases, and for males 20·8 per 1,000 of total notified cases.

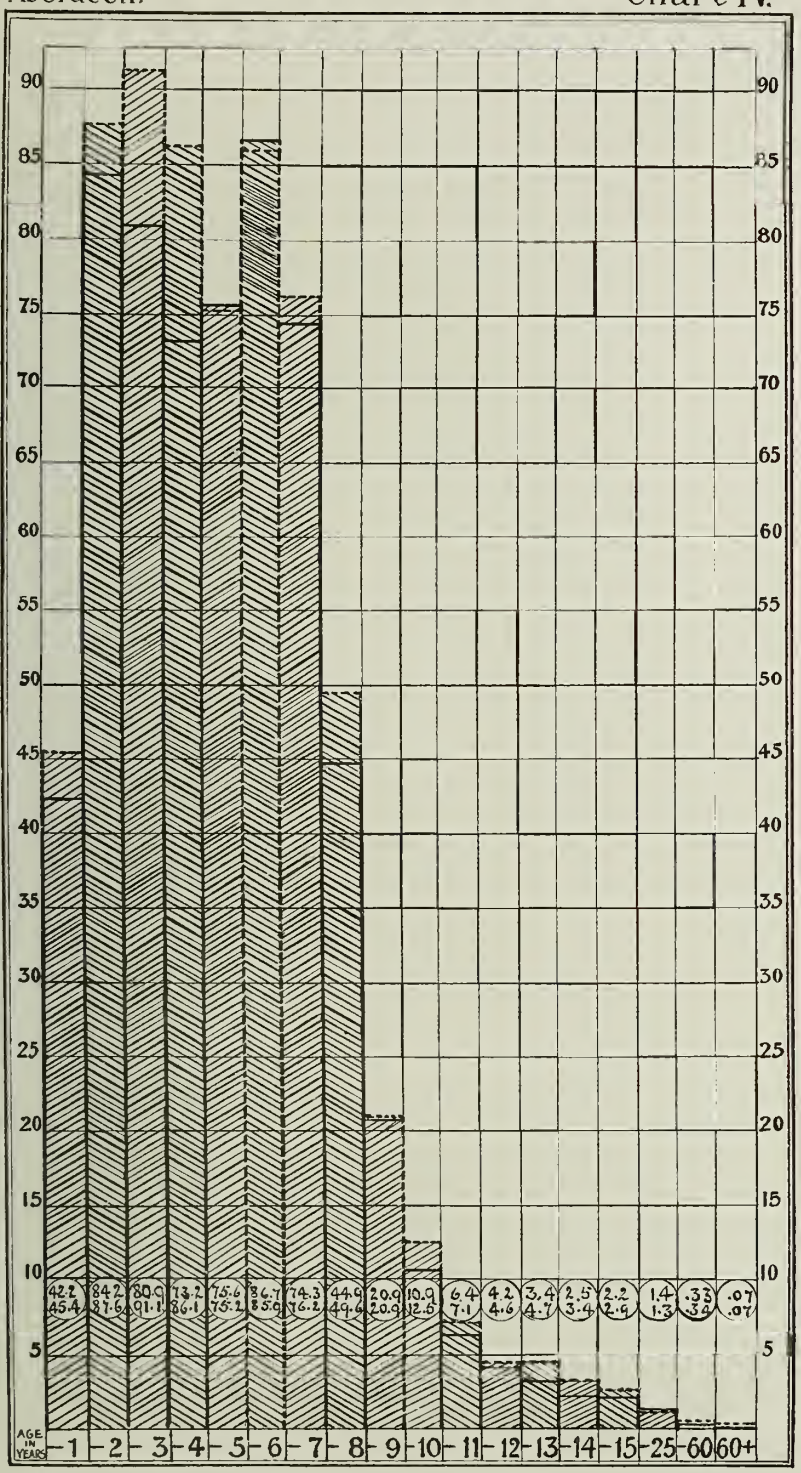
Why the second attacks should be greater amongst males than females at the age-group of fifteen to twenty-five, it is difficult to say, especially as females of this age, being more among younger children than boys are, should be more exposed to infection.

Second Attacks.

Ten Years—1893-1902.

Age-Period.	Males.			Females.			Both Sexes.			Deaths among Cases under Second Attack.	
	Total number of Cases Notified.	Number of Second Attacks.	Second Attacks per 1,000 of total cases notified.	Total number of Cases Notified.	Number of Second Attacks.	Second Attacks per 1,000 of total cases notified.	Total number of Cases Notified.	Number of Second Attacks.	Second Attacks per 1,000 of total cases notified.	Males.	Females
Under 5 years, .	7,071	60	8·4	7,041	76	10·7	14,112	136	9·6	3	4
5—15 ,, .	4,757	169	35·5	4,727	247	52·2	9,484	416	43·8	0	0
15—25 ,, .	217	24	110·6	242	21	68·7	459	45	98·0	0	0
25 years and upwds.	90	0·0	0·0	109	2	18·3	199	2	10·0	0	0
	12,135	253	20·8	12,119	346	28·5	24,254	599	24·6	3	4

Aberdeen. Chart IV.

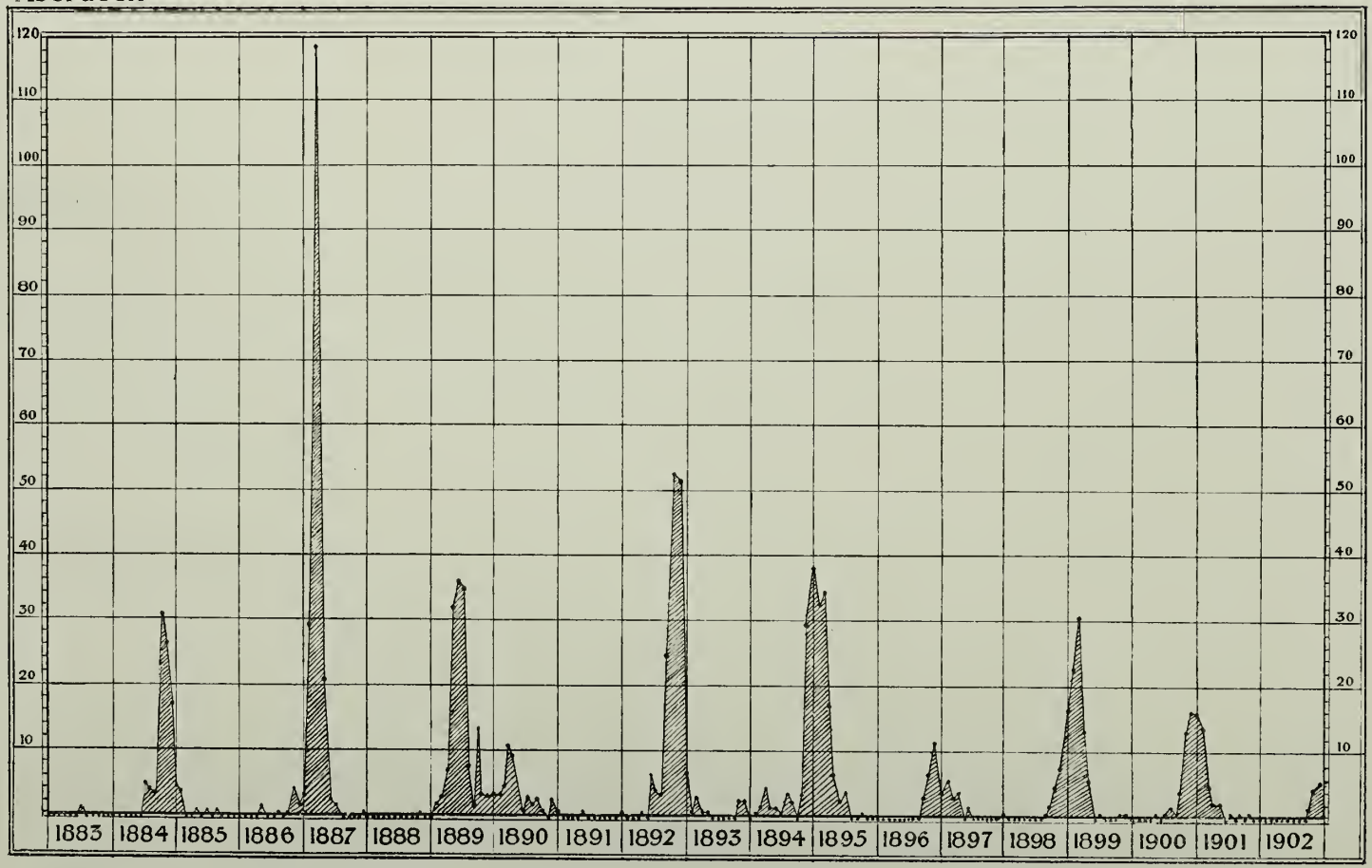


MEASLES.- Attacks per 1000 of Population at each age and of each sex. (average of 20 years- 1883-1902)

MALES FEMALES

Aberdeen

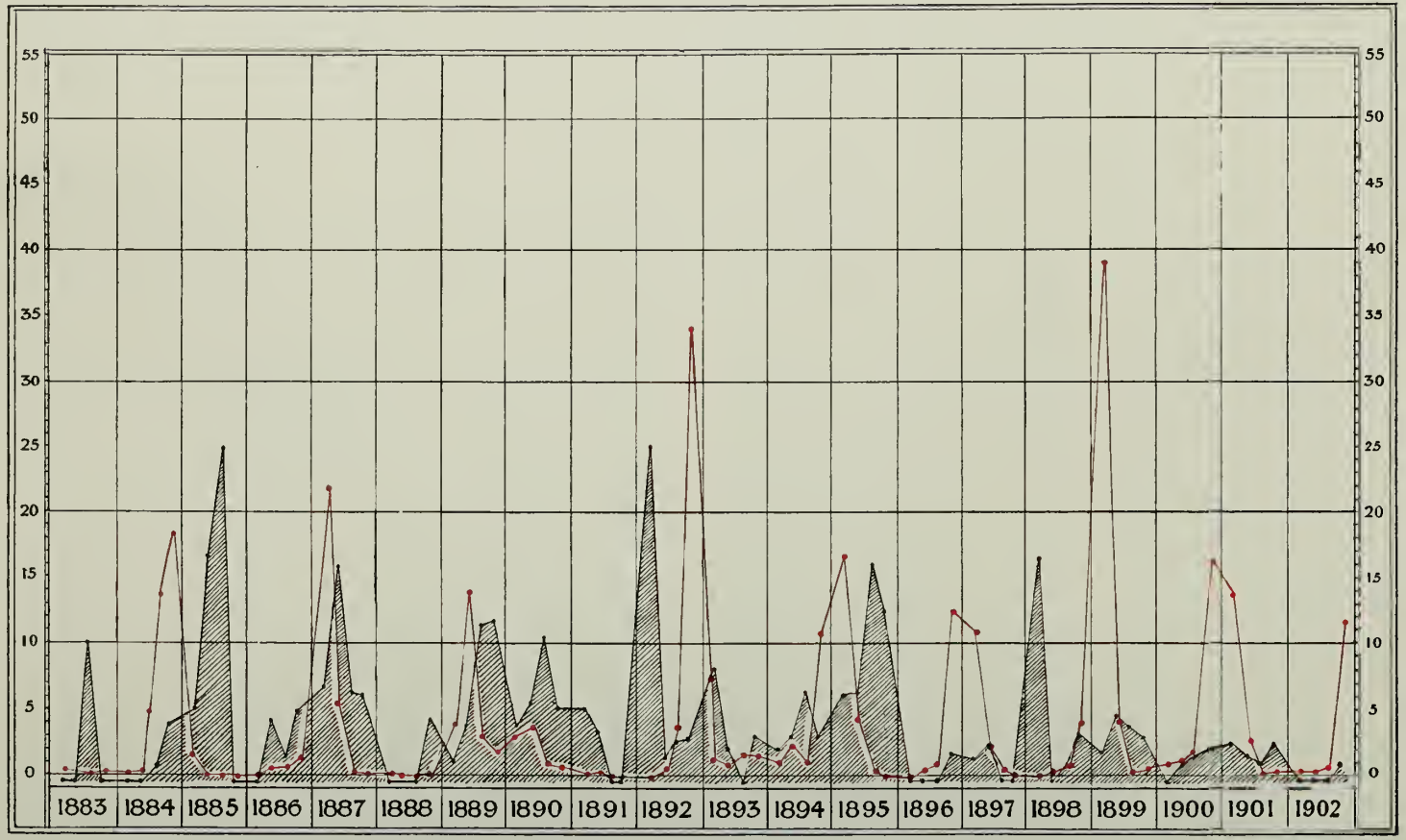
Chart V.



MEASLES.~ Monthly Death-rate per 100,000 of Population from 1883 to 1902.

Aberdeen

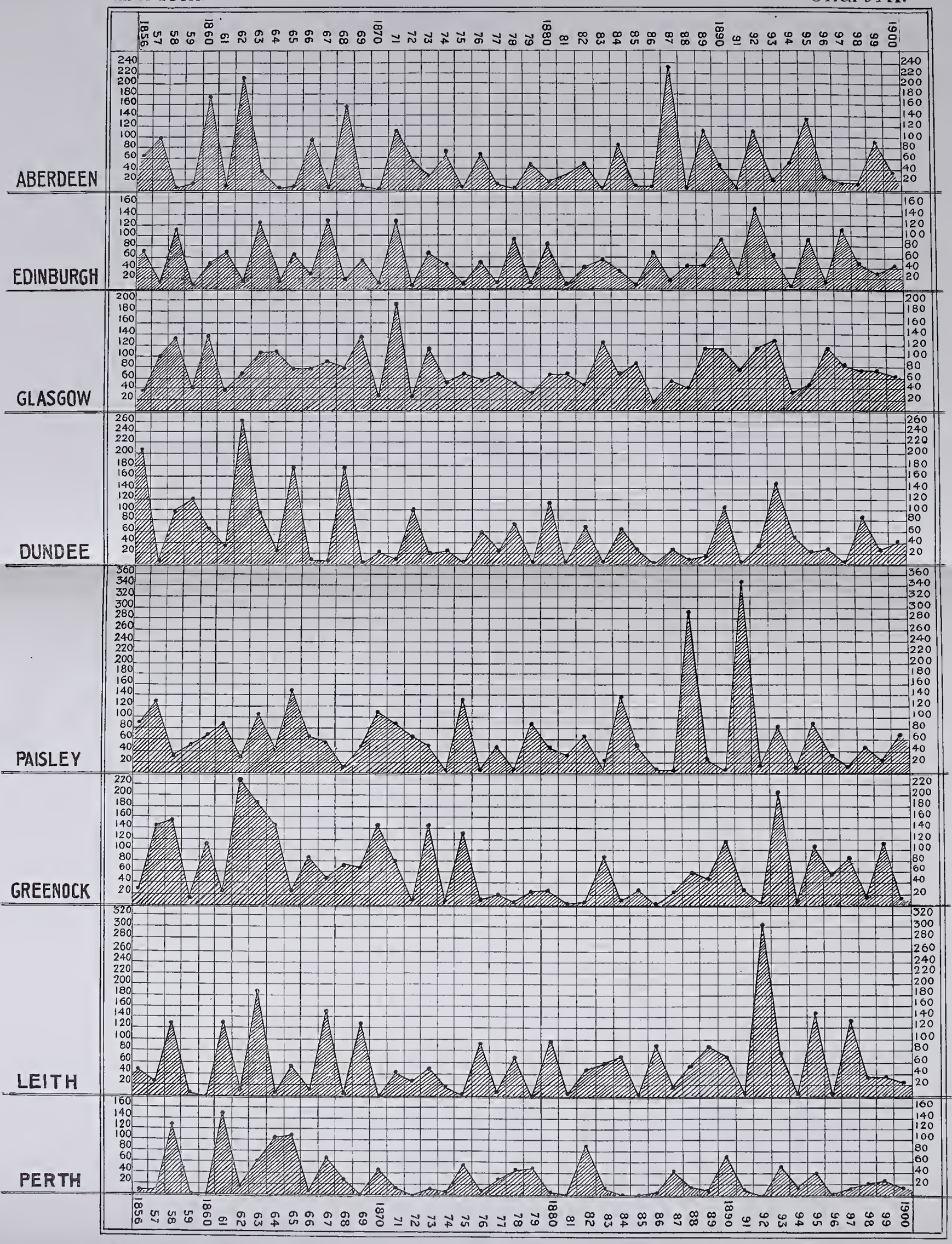
Chart VI.



MEASLES.~ Attack-Incidence(per 1000 of Population) Case Mortality(per 100 cases) } in each Quarter of the years 1883-1902.

Aberdeen.

Chart XI.



MEASLES.~ Annual Mortality per 100,000 of Population in eight towns in Scotland, from 1856 to 1900, (45 years).

Third Attacks.

There were recorded thirteen cases of third attacks during the ten years, viz., in five males and eight females. Two of these were under five years of age, ten under fifteen, and one was fifteen years of age. Third attacks thus stand in the proportion of 21·8 per 1,000 *second attacks.*

The value of the records of second and third attacks is probably not great, as it is impossible to eliminate the error due to German measles being mistaken for measles. In every case of measles inquiry was invariably made as to a previous attack, a question as to this being included in the schedule of the visiting inspector.

IV.—Association of Measles and Whooping Cough.

(Chart I.)

Chart I., besides showing the monthly incidence of measles for twenty years, also shows the monthly incidence of whooping cough for the same period, on the same scale, and stated per 100,000 of population.

Epidemics of measles and whooping cough so frequently follow each other that it has been generally supposed that the former predisposes to, or in some way prepares the way for, the latter.

If, as stated, measles precedes whooping cough, the line showing the decline of the measles epidemic wave should be crossed by the rising line of the whooping cough epidemic wave. This, as a matter of fact, occurs only in one instance, viz., in 1895. Indeed, it will be seen that the declining wave line of whooping cough is more often overlapped by the rising epidemic wave line of measles, as if whooping cough were the precursor of measles. In most cases the peak of the measles epidemic is usually considerably closer to the peak of the preceding than to that of the succeeding whooping cough epidemic.

Both diseases tend to be biennial in their epidemic periodicity, and alternate with considerable regularity.

MORTALITY.

(Tables I. and II.; Charts V. and XI.)

Chart V. exhibits graphically the death-rate from measles per 100,000 of population for each month of the twenty years—1883 to 1902. In its main features this chart follows closely Chart I., which shows the monthly attack-incidence for the same period.

The chart shows a fairly steady decline in the mortality since about 1887. The peaks of mortality are decidedly lower as the years progress. The average annual mortality for the first ten years is 62·4 per 100,000 of population, while for the second ten years it is 43·0 per 100,000—a reduction of almost one-third.

Chart XI. gives the mortality from measles since 1856, but the mortality is represented for each year, and not for each month, as in Chart VI. Reference will be made to this chart at a later stage.

CASE-MORTALITY.

I.—In respect of Time and Season.
II.—In respect of Age and Sex.
III.—In relation to Attack-Incidence.
IV.—In relation to Size of House.

I.—Case-Mortality in respect of Time and Season.

A. Time.

(Chart VI.)

Chart VI. represents in graphic form the progress of the case-mortality in measles for the twenty years—1883 to 1902. The deaths occurring in each quarter of the year are stated as a percentage of the cases notified in the same quarter. For purposes of comparison the attack-incidence per 1,000 of population for each quarter is also shown.

The chart shows that the case-mortality has been undergoing a considerable diminution in the course of the twenty years. In the first five years it was 5·3 per cent. ; in the second five years, 3·8 per cent. ; in the third five years, 3·5 per cent. ; and in the last five years, 1·9 per cent. As all deaths from measles have presumably throughout the whole period been registered, while, probably, notification of sicknesses was less complete in the earlier than in the later years, a certain proportion of the fall in the case-mortality may be more apparent than real ; but when allowance is made for this there remains a sufficient margin of difference to justify the inference that there has been a real decrease in the case-mortality.

The very irregular height of the case-mortality is noteworthy, varying from 0 to 25 per cent. It will be observed that the highest peaks of case-mortality in the chart coincide for the most part with a waning attack-incidence, and are no doubt partly due to some of the numerous cases in a preceding quarter ending fatally in the next quarter, when the cases notified were few in number. But as the chart is prepared for quarters in place of months, in order to assist in avoiding the distortion due to this cause, it is probably a legitimate inference that epidemics of measles are more fatal during their decline than during their rise. Some of the highest peaks of case-mortality occur in inter-epidemic periods, and should not have too much importance attached to them, owing to the smallness of the numbers to which they apply.

It is also to be remarked that some of the largest epidemics—for example, in 1892-93 and 1898-99—have had a very low case-mortality.

The general decline of the case-mortality in Aberdeen may be in part due to the greater precautions and care exercised by parents in regard to cases on account of the supervision of the Sanitary Department, consequent upon notification, and to the printed instructions provided by the Department in each case. But too much must not be claimed for this.

B. Season.

(Chart VII.)

Chart VII. shows graphically the average percentage mortality among cases notified in each month of the year. It deals with 40,374 cases and 1,364 deaths, which occurred during the twenty years 1883 to 1902. The deaths forming the case-mortality in any month are the deaths occurring among the deaths notified during the month, whether the deaths took place in that or a later month.

The case mortality is highest in the spring and summer months. There would appear to be in the course of the year, three maxima, viz. :—In April (6·1 per cent.), July (5·6 per cent.), and November (3·0 per cent.), with corresponding minima in September (0·95 per cent.), December (2·5 per cent.), and June (3·1 per cent.).

II.—Case-Mortality in respect of Age and Sex.

1.—Age (Sexes combined).

(Chart VIII.)

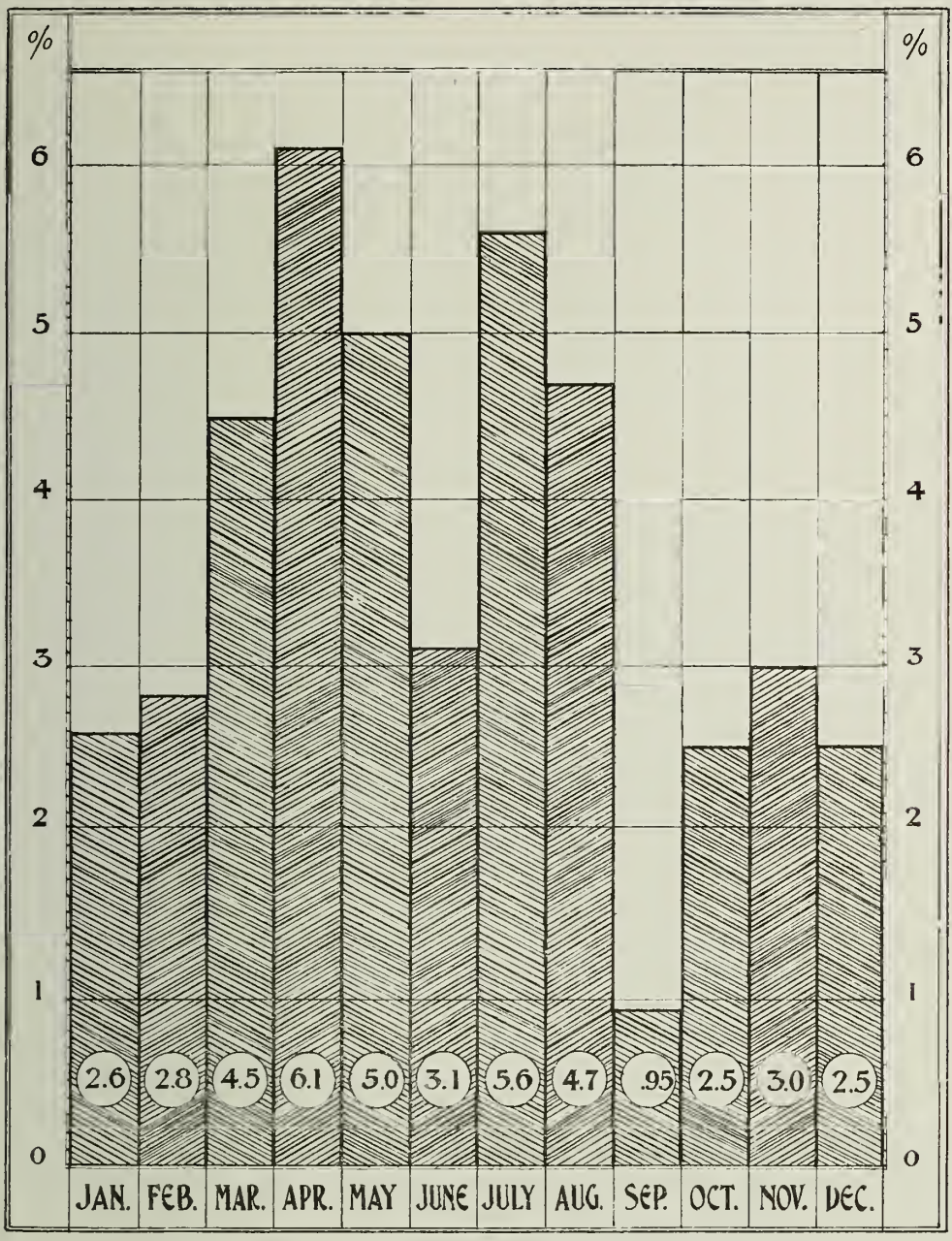
Chart VIII. represents the deaths from measles per 100 cases, at all ages, and at different ages, during the twenty years ending 1902, males and females being taken together.

The case-mortality is shown for each year of life up to the age of fifteen years. Above this age the cases are arranged under three age-periods—fifteen to twenty-five years, twenty-five to sixty years, and sixty years of age and upwards. The first year of life has been subdivided to show the case-mortality in each of the four quarters.

The case-mortality for all ages taken together, and for the whole period 1883-1902, is 3·33 per 100 cases.

As to the case-mortality at the different ages, it is clearly seen from the chart that the first and second years constitute the period of life at which measles is by far the most fatal, the rates for these years being 13·9 and 10·0 per cent. respectively. In the third year of life there is a large drop to 3·4 per cent., which is only a little more than one-fourth of the rate in the first year. During the fifth and sixth years of life, the mortality is between 0·5 and 1 per cent., while between the seventh and eleventh years it is about a half per cent., or less. But for two deaths in the

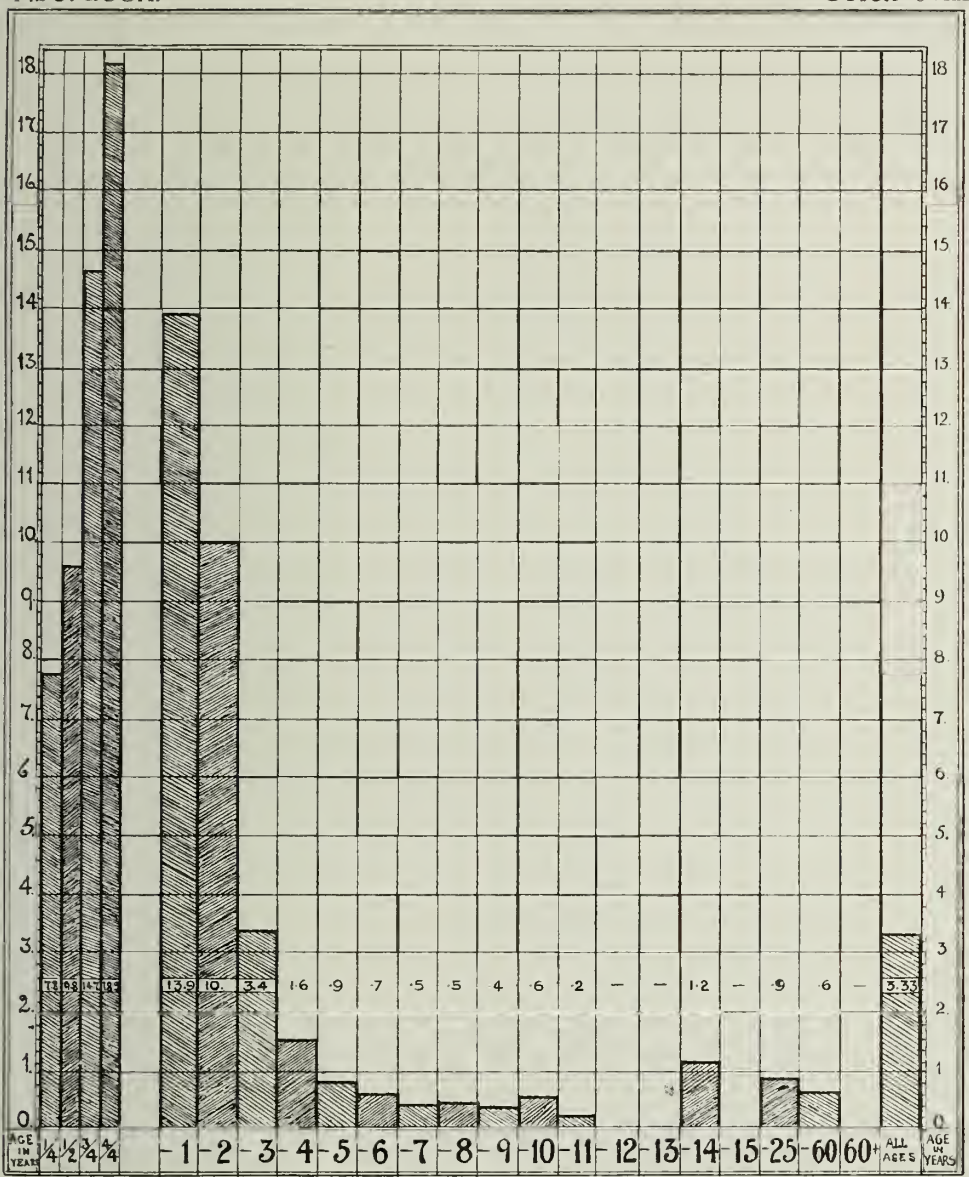
Aberdeen. Chart VII.



CASES	5007	5369	5500	2462	1791	1335	1053	589	1984	3873	5212	6199	40374
DEATHS	131	151	255	152	90	43	60	28	19	98	158	161	1346

MEASLES.~ Case-Mortality Deaths per 100 cases in each of the twelve months of the year, (average of 20 years-1883-1902.)

Aberdeen. Chart VIII.

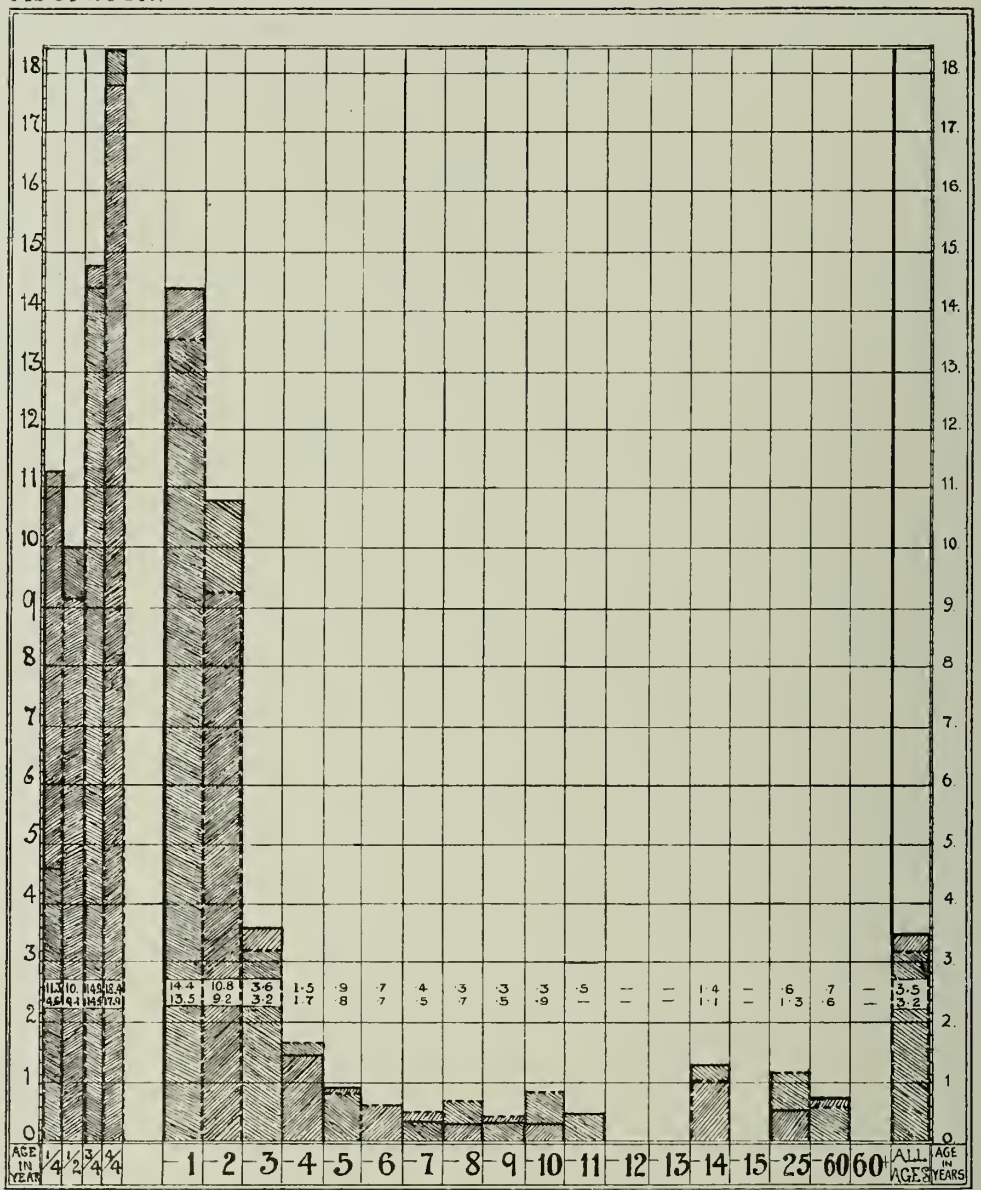


	¼	½	¾	4/4	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	25	60	60+	TOTAL
Cases	244	665	1267	3862	3034	5222	5195	3053	4836	5352	4628	2818	1258	672	406	259	241	169	150	762	312	7	40374.
Deaths	19	64	186	157	426	526	178	82	43	35	21	14	5	4	1	-	-	2	-	7	2	-	1346.

Number of Cases and Deaths dealt with at each age

MEASLES.- Case Mortality, being the deaths per 100 cases at each age (average of 20 years.)
(Sexes Combined) (1883-1902)

Aberdeen. Chart IX.



Males	Cases	115	358	669	417	1559	2643	2651	2434	2439	2758	2400	1340	624	321	194	124	105	74	67	363	136	6	20287
	Deaths	13	36	100	77	226	288	96	37	23	18	9	4	2	1	1	—	—	1	—	2	1	—	709
Females	Cases	120	307	594	448	1475	2579	2544	2619	2547	2594	2228	1478	634	351	212	135	136	95	83	399	176	1	20087
	Deaths	6	28	96	80	200	239	82	45	20	17	12	10	3	3	—	—	—	1	—	5	1	—	637

Number of Cases and Deaths dealt with at each age

MEASLES.- Case Mortality, being the deaths per 100 cases at each age & for each sex (average of 20 years) (1883-1902)

MALES ▭ FEMALES ▨

fourteenth year, the mortality between the eleventh and fifteenth years might be regarded as nil. At the age-periods of 15-25 and 25-60, the case-mortality increases somewhat, being between a half and one per cent., or about as high as in the fifth and sixth years of life. Above the age of sixty there were no deaths, but there were only seven cases.

On analysing the case-mortality within the first year of life, one finds that the rate is lowest in the first quarter, with 7·8 per cent., and rises with each quarter to 18·2 in the fourth quarter, the mortality being distinctly higher in the two later quarters than in the earlier quarters.

This chart also gives the number of cases, as well as deaths, in each quarter of the first year of life; and it will be observed that the third quarter is by far the most prolific in attacks of measles.

Dr. Laing, in his paper on whooping cough, showed that in the first year of life the greatest case-mortality is in the first quarter, thus differing from measles.

The practical conclusion from an examination of this chart is that it is of the greatest moment to prevent children taking measles during the first three years of life, but especially during the first two. If the attack could in every case be postponed till after these years, it is obvious that the reduction of the mortality from this, the most common of the zymotics, would be enormous.

Almost exactly the same observation fell to be made by Dr. Laing in his corresponding paper on whooping cough, where it was also shown that the years of high case mortality were especially the first two years of life. It may be of interest to give the case-mortality for measles and whooping cough side by side, during the first twelve years of life.

Case-Mortality (per cent.).

Age (years)—	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Measles, . . .	13·9	10·0	3·4	1·6	·9	·7	5	·5	·4	·6	·2	0
Whooping Cough, .	12·5	10·1	3·3	2·2	1·6	·5	·7	·1	·3	·0	·0	·0

In regard to the quarters of the first year, whooping cough, differing from measles, shows the highest case-mortality in the first and second quarters, and the lowest in the third and fourth; but, as with measles, the cases or sicknesses are most numerous in the third quarter.

2.—Age (Sexes separate).

(Chart IX.)

Chart IX. shows the case-mortality of measles at different ages, for each of the sexes.

The average case-mortality at all ages, taken together, was greater for males than for females. For the former it was 3·4 per cent. and for the latter 3·1 per cent.

As regards the case-mortality at the different ages, the rate for males is distinctly greater in the first three years. In the fourth year the female rate is slightly higher; in the fifth the male rate predominates by very little, and in the sixth the rates for both sexes are equal. In the next four years the mortality is higher among females. At the higher ages, the deaths are so few as to render of little value any comparison at these ages.

With regard to the four quarters of the first year of life, it will be seen that in the first quarter the female case-mortality is greatly in excess of the male, being 11·3 per cent. as against 4·6 per cent. In the second, third, and fourth quarters, there is not much difference between the sexes, but in each the male case-mortality is the higher.

3.—Case-Mortality in Relation to Attack-Incidence.

(Chart VI.)

Chart VI. was prepared in order to study the influence, if any, of a high or low attack-incidence on case-mortality, as well as to ascertain whether case-mortality tends to vary with the advance of an epidemic.

The chart shows the deaths occurring in each quarter of the year, stated as percentages of the cases notified in the same quarter; it also exhibits the attack-incidence, stated per 1,000 of population, for each quarter.

A defect in the construction of Chart VI., as already noted, is that the deaths occurring during a given quarter do not correspond exactly with the cases reported during the same period, as

certain of the deaths at the beginning of the quarter are of cases reported in the previous quarter, and some of the cases at the end of the quarter terminate fatally in the following quarter ; but as measles is not usually a disease of long duration, and the chart periods are quarterly, any error arising from this is probably not great.

On examining the epidemics individually with respect to the relationship between extent of epidemic and height of case-mortality, no general law is seen to emerge, although, on the whole, it would appear as if a large epidemic was usually associated with a low case-mortality, and a small epidemic with a high case-mortality ; but there are several exceptions.

In comparing the progress of an epidemic with changes in case-mortality, it will be found to be the usual rule that the case-mortality increases greatly during the decline of the epidemic, but this increase does not necessarily imply a corresponding increase in the virulence of the cases, as the increase may be partly due to deaths of cases notified in a preceding quarter, when the cases were, in point of number, at their height. But after allowing for this, it can scarcely be doubted that the chart seems to prove a real rise in the case-mortality during the decline of the epidemic. It has, however, to be noted that this rise has been much less apparent in the more recent epidemics.

The times of the very highest case-mortality appear to occur during the inter-epidemic periods, when the cases of measles are few, but the excessive mortality may be partly fictitious, and due to relatively less complete notification of cases than in epidemic times.

IV.—Case Mortality in Relation to Size of House.

(Chart X.)

Chart X. has been prepared for the purpose of demonstrating the influence of social status on the case-mortality of measles. The size of the house in each case being obtainable from the records of the Sanitary Department, and, being a fair criterion of social status, forms the basis of the classification in this chart.

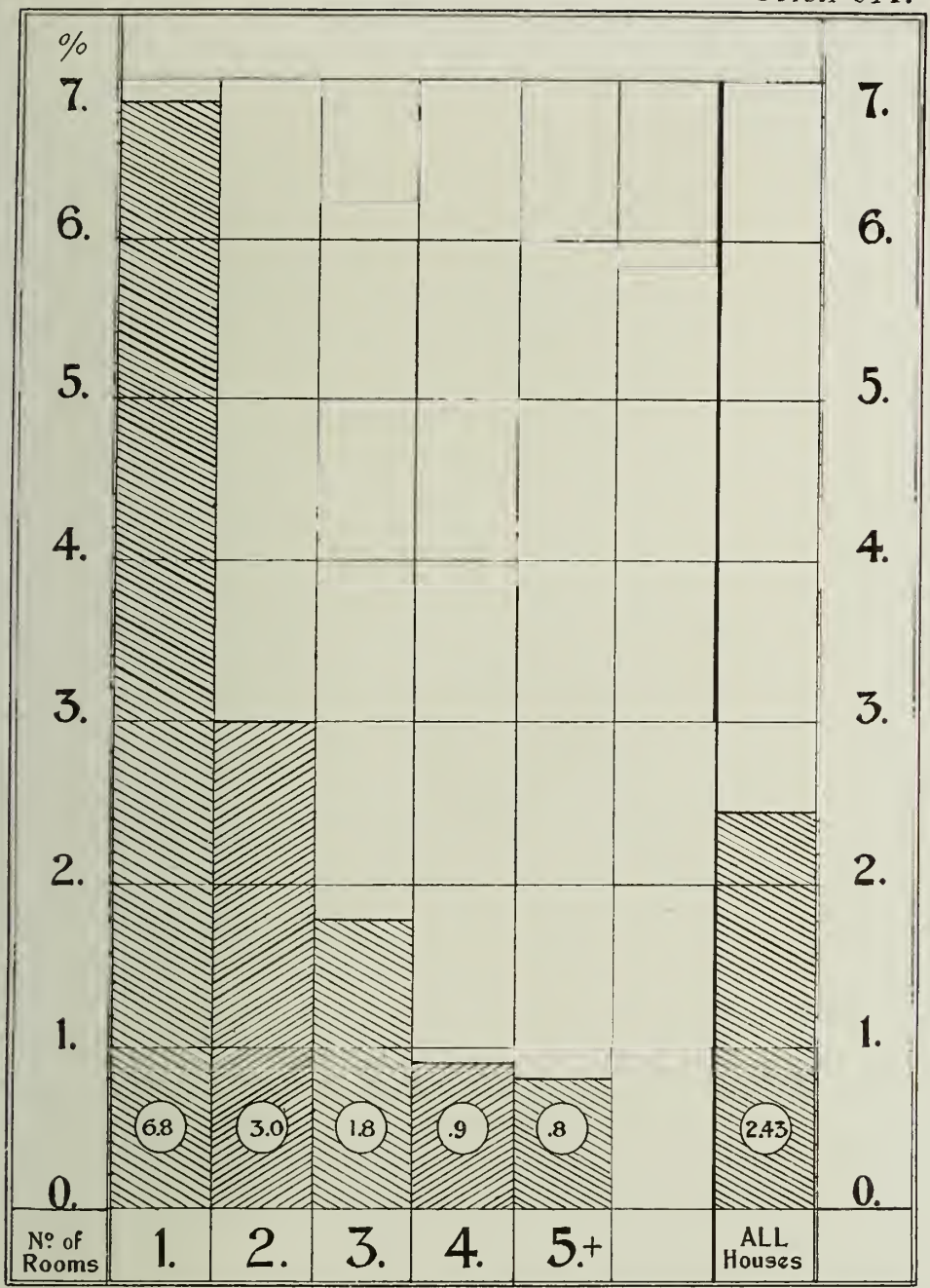
The different houses have been classified, according to the number of rooms, into five groups ; and the cases and deaths occurring in each group are given. The average number of inmates in each group of houses is also stated.

The fifth group—five rooms and over—includes all institutions, hotels, &c., except the Hospitals and Infirmaries. Cases *occurring* in these institutions are not included. Cases removed to such institutions for treatment are, of course, classed with the size of house from which they were removed. It was thought to be unfair to the class of larger houses to include infirmaries, as cases occurring in such institutions - *e.g.*, the Sick Children's Hospital—attack children already weakened by other diseases, and the case-mortality is thus greatly raised.

As an alternative such cases might have been referred back to the class of house from which they originally came, but the difficulty of tracing the house was great, especially in cases from the Children's Hospital, many of which had come from the country. Accordingly in Chart X. both cases and deaths in such institutions have been omitted, thus relieving houses, probably of the first and second classes, of a little of their proper mortality. The results seen in Chart X. are striking. The average case mortality from measles for all houses taken together amounted to 2·4 per cent., but in one-roomed houses it was 6·8 per cent., or almost three times as great as the average ; while in houses of four rooms and houses of five rooms and upwards it was barely one per cent., or only about one-third of the average. In other words, among those attacked by measles, for every child that died in a four or five-roomed house, about seven children died in one-roomed houses. The mortality among measles patients in two-roomed houses was 3·0 per cent., or rather less than half the rate in one-roomed houses ; and in three-roomed houses it was 1·8 per cent., or exactly twice as high as in four-roomed houses.

A comparison with a similar chart for whooping-cough, prepared by the late Dr. James S. Laing, shows a like result, although the fall in the case-mortality in larger houses is not so marked. The figures for whooping cough were—in one-roomed houses, a case-mortality of 7·8 per cent. ; in two-roomed houses, 4·5 per cent. ; in four-roomed, 3·4 per cent. ; in houses of five rooms and upwards, 2·2 per cent. ; and for all houses the percentage of deaths was 4·7 per cent., thus, apparently, showing that whooping-cough is somewhat less amenable to improved social conditions than measles.

Aberdeen. Chart X.



CASES	1067	11464	6779	2046	2675		24031	
DEATHS	73	348	122	19	22		584	
AVERAGE No OF INMATES.	4.1	5.2	5.8	6.2				

MEASLES.– Case Mortality in different sizes of houses. (1893-1902)
(per 100 cases notified.)

MEASLES.~ Analysis of Fatal Cases during the years 1893-1902 in regard to nature of Complications as secondary causes.

AGE	TOTAL Nº OF CASES	TOTAL Nº OF DEATHS	Nº OF DEATHS IN WHICH NO REGISTERED COMPLICATIONS	Nº OF DEATHS IN WHICH COMPLICATIONS REGISTERED									
				BRONCHO-PNEUMONIA	ACUTE PNEUMONIA	ACUTE BRONCHITIS	TUB & ACUTE MENINGITIS	OTHER TUB. DISEASES	LARYNGITIS	GASTRO-INTESTINAL DISEASES	MIASMATIC DISEASES	CONVULSIONS	OTHER DISEASES.
INFANT PERIOD Under 1 YR	1802	210	34	32	33	34	11	—	2	3	3	48	9
" 1 " 2 "	3099	244	40	58	39	40	11	3	8	13	5	22	5
" 2 " 3 "	3135	64	7	17	11	10	8	2	1	2	6	3	2
" 3 " 4 "	3125	37	8	13	6	3	—	—	—	—	2	1	4
" 4 " 5 "	2950	28	4	8	5	4	1	1	—	—	—	—	2
SCHOOL PERIOD " 5 " 15 "	9484	34	3	6	6	10	1	2	1	1	3	2	—
ADOLESCENT PERIOD " 15 " 25 "	459	1	—	—	—	—	—	—		—	—	—	—
ABOVE 25 "	200	1	—	—	1	—	—	—	—	—	—	—	—
TOTAL	24254	619	97	134	101	101	27	8	15	19	19	76	22
Above distribution of Fatal Cases stated as per-centages of Total Deaths at each age.													
Under 1 YR			16.1	15.2	15.7	16.1	5.2	—	.95	1.9	1.4	22.8	4.2
" 1 " 2 "			16.3	23.7	16.0	16.3	4.5	1.2	3.2	5.3	2.4	9.0	2.4
" 2 " 3 "			10.9	26.5	17.1	15.6	4.6	3.1	1.5	3.1	9.3	4.6	3.1
" 3 " 4 "			21.6	35.1	16.2	8.1	—	—	—	—	5.4	2.7	10.8
" 4 " 5 "			14.2	28.5	17.9	14.3	3.5	3.5	10.7	—	—	—	7.1
" 5 " 15 "			8.8	17.6	17.6	29.4	2.9	5.9	2.9	—	8.8	5.9	—
" 15 " 25 "			100.0	—	—	—	—	—		—	—	—	—
Above 25			—	—	100.0	—	—	—	—	—	—	—	—
TOTAL			15.6	21.6	16.3	16.3	4.3	1.2	2.4	3.0	3.0	12.2	3.5

COMPLICATIONS OF MEASLES.

In Table III. will be found an analysis of over 24,000 cases of measles, showing the complications registered as occurring in 619 fatal cases—the cases being arranged according to age. An attempt was made to ascertain the average duration of fatal cases, but owing to the frequent absence of information as to the duration in the death certificate, and to the extreme variability of the duration where stated, it was thought that the results would not justify the labour.

It will be seen that 15·6 per cent. of all deaths from measles were reported as uncomplicated; that 22 per cent. were complicated with broncho-pneumonia; 16 per cent. with acute pneumonia; 16 per cent. with bronchitis; 4 per cent. with tubercular meningitis; and 1·2 per cent. with other tubercular diseases. In 12·2 per cent. the complication was convulsions.

Where more than one complication was stated in the death certificate the primary complication is taken as the basis of the classification.

It is interesting to observe that broncho-pneumonia as a complication was most frequent among children of the age of four, and least common among infants under one year. Acute pneumonia was about equally common at all ages. Acute bronchitis, differing from broncho-pneumonia, was least common at the age of four, and most common at the school age-period.

Among other complications, meningitis was most common during the first year of life. Gastro-intestinal diseases were most frequent during the second year, and much less frequent during the first year. Convulsions were by far most common among infants under one year.

COMPARISON OF ABERDEEN WITH OTHER SCOTTISH TOWNS IN RESPECT OF MORTALITY FROM MEASLES. (1856-1900.)

(Chart XI.)

Chart XI. shows in graphic form the annual mortality from measles per 100,000 of population in eight of the principal towns of Scotland since 1856, or the year following the commencement of the civil registration of deaths. The accompanying table gives the average annual mortality from measles in each town for three component periods, viz.—1856 to 1872, 1873 to 1887, and 1888 to 1900.

It will be observed that the towns differ very considerably in their total average mortality for the whole period. Glasgow is the highest, with 78 per 100,000, Paisley and Greenock come next, with 67 and 65, and are followed, in order, by Leith with 57, Dundee with 55, Aberdeen with 52, and Edinburgh with 50. Perth, with 30, has distinctly the lowest mortality for the whole period.

AVERAGE ANNUAL MORTALITY FROM MEASLES, PER 100,000 OF POPULATION.

	1856 to 1872.	1873 to 1887	1888 to 1900.	1856 to 1900.
Aberdeen,	61	44	51	52
Edinburgh,	52	39	58	50
Glasgow,	86	64	82	78
Dundee,	83	34	44	55
Paisley,	73	47	81	67
Greenock,	92	35	66	65
Leith,	56	42	75	57
Perth,	43	22	22	30
	68	40	59	56

Aberdeen, therefore, if Perth be excepted, occupies one of the lowest positions. It is interesting to note that, excluding Perth, the four towns with the lowest mortality are all situated on the east coast, while the three highest are on the west coast, or very near to it. Within the last twelve years, however, the mortality in Leith has risen to the west coast level.

On the whole, it cannot be said that there is any general rise or fall of the mortality in the selected towns. In some—if the comparison is restricted to the earliest and latest periods—there is practically no change—*e.g.*, in Edinburgh and Glasgow; in others, such as Dundee, Perth, and

Greenock, there is a large fall, while in Leith there is a large rise. In Aberdeen there has been a moderate fall.

An examination of Chart XI. gives an impression of three different periods of epidemic prevalence and mortality—the first, consisting of a succession of high mortality peaks, the second of low peaks, and the third of high peaks again. This is common to all the towns represented in the chart, with the exception of Perth, which shows no rise in the third period with high peaks.

This cyclical change is not equally well defined in all the towns. In some the succession of low peaks seems to begin earlier, and, in others, later. The table of figures confirms the impression derived from the chart.

In comparing the charts for the several towns, one is struck by the almost constant epidemicity of measles in Glasgow—that is, in by far the most populous town, while in the smallest town—Perth—the epidemic peaks are wider apart than anywhere else. In Aberdeen the interval between the epidemic peaks is almost always two or three years. In Perth it extends not infrequently to four or five years. Generally, the larger the town, the greater is the tendency to frequency of epidemics.

An interesting question is whether the peaks in the different towns coincide in such a manner as to suggest any generally operative influence, atmospheric or otherwise, which might assist or determine the simultaneous occurrence of measles epidemics.

A careful comparison of the towns in the chart shows that, except in the case of Leith and Edinburgh, which practically form one town, no synchronism of peaks is to be found. Such towns as Paisley and Greenock, Dundee and Perth, though close to each other, show very little correspondence in the recurrence of their epidemics of measles.

The one appearance in the chart more or less common to all is what has already been spoken of as possibly indicating a long-period prevalence or mortality wave, and this, being a mortality curve, may indicate a gradual change in severity of type, such as has been frequently remarked for scarlet fever, rather than a change in prevalence due to climatic or other causes.

SUMMARY.

Attack-Incidence (Morbidity).

1. So far as the notification records show, the prevalence of measles in Aberdeen has apparently increased considerably during the last ten years, 1892 to 1902 (Chart I.), but this is probably in part due to increased efficiency in notification. A review of the mortality since 1856 points to the prevalence being as great for some years after 1856.

2. The numerical intensity of measles epidemics at their height has on the whole increased throughout the past twenty years, as seen from Chart I., but this also may be in part, if not altogether, due to more complete notification.

3. The periodicity is chiefly biennial in Aberdeen, though sometimes triennial. In still larger towns the tendency to a short periodicity is still more pronounced (Charts I. and XI.).

4. There appears to be a periodicity among the epidemic years themselves, indicated by a rise at every third epidemic (Chart I. and Table I.).

5. There is also the suggestion of a still wider cyclical change in the form of a prevalence wave covering a period of about 12 to 15 years (Chart XI.).

6. Measles in Aberdeen is most prevalent in the cold months of winter and spring, and least prevalent in late summer and early autumn (Chart II.).

7. The attack-incidence is highest among children in the second to the seventh years of life. In the first and eighth years of life it is, roughly, only about a half of the incidence at the years stated (Chart III.). After the eighth year it rapidly falls.

8. Females appear to be slightly more liable than males to measles, the difference being most marked in the third and fourth years of life (Chart IV.).

9. Second attacks occurred in about 2½ per cent. of the notified cases, and were more frequent in females than males, except between the ages of fifteen and twenty-five years. Second attacks are rare at ages above twenty-five years. Third attacks occurred in fully 2 per cent. of the cases of second attack, and were more frequent at the later than the earlier ages. Confusion in diagnosis between measles and German measles probably invalidates these conclusions.

10. Epidemics of measles and whooping cough alternate with considerable regularity—measles following upon whooping cough, rather than whooping cough on measles (Chart I.).

Mortality.

11. In Aberdeen, the average annual mortality from measles during the past ten years has fallen considerably, having dropped from 62·4 per 100,000 of population in 1883-1892 to 43·0 in 1893-1902. In the periods preceding 1883 the rate was, from 1856 to 1872, 61 per 100,000 of population, and from 1873 to 1887 it was 44 (Charts V. and XI.).

CASE-MORTALITY.

12. The case-mortality in Aberdeen has during the twenty years of notification fallen greatly, viz. :—from 5·3 per cent. in the first five years, to 1·9 per cent. in the last five years; but the fall may be in part more apparent than real, due to increasing efficiency of notification (Chart VI.).

13. The case-mortality shows three maxima in the course of the year in April, July, and November, the highest being in April—with a decided minimum in September (Chart VII.).

14. The case-mortality is highest, by far, in the first and second year of life, and highest of all in the fourth quarter of the first year of life (Charts VIII. and IX.). It is, therefore, of great importance to protect children from measles during these years.

15. The average case-mortality at all ages, taken together, is slightly higher in males than in females, and is especially so in the first three years of life (Chart IX.).

16. The case mortality does not exhibit any definite relationship to the size of an epidemic. It tends, however, to increase with the progress of an epidemic, and is much higher at the end than the beginning. It is usually highest of all in the intervals between epidemics (Chart VI.).

17. The case-mortality is very markedly affected by social conditions, as determined by the size of house. The smaller the house, the greater is the case-mortality (Chart X.).

COMPARISON OF THE PRINCIPAL SCOTTISH TOWNS IN RESPECT OF MORTALITY FROM MEASLES (1856 TO 1900).

(Chart XI.)

18. The towns differ considerably in their average mortality rate from measles during this period, the average mortality in the most populous town—Glasgow—being fully two and a half times as great as in the least populous town—Perth.

19. There are considerable differences between the towns in the progress of the mortality rate. In the two largest towns the rate is practically stationary. In the other towns, except Leith and Paisley, it has fallen.

20. The larger the town, the shorter, on the whole, is the periodicity of epidemic prevalence—the periodicity showing a tendency to be biennial and, occasionally, triennial.

21. There is no evidence of the epidemicity being determined by atmospheric or similarly widespread conditions. It is probably determined for the most part by the accumulation of susceptible material.

(IV.)

Some Experiments with Disinfectants:

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The following investigation was undertaken at the suggestion of Professor Hay, in order to obtain, at first hand, reliable information as to the efficiency of certain disinfectants, especially formaldehyde or formaline, for the guidance of the Public Health Department of the City.

A trustworthy means of gaseous disinfection has been long sought for by Medical Officers of Health. It is the accepted opinion that there is no better gaseous disinfectant than formaldehyde. The disinfectant properties of formaldehyde have been investigated by numerous experimenters, but their results have been by no means uniform. While all, or nearly all, agree as to its undoubted value as a surface disinfector, there is a wide variance of opinion as to its penetrating power. It is admitted by all that it is virtually non-poisonous, and does not injure textile fabrics. Kenyon states that he subjected over 225 samples of different textile fabrics, hair, fur, leather, &c., to crucial tests, using solutions of various strengths and a saturated atmosphere of the gas. The results obtained were in every way satisfactory.

Formaldehyde exists in at least three well-recognised isomeric states.

1. Formaldehyde (Formic Aldehyde), a gas at ordinary temperature, colourless, and possessing slight odour, but having an extremely irritating effect upon the mucous membranes of the nose and conjunctiva. At a temperature of about 20° C. the gas polymerizes into paraformaldehyde, known commercially as paraform.

2. Paraform, a white substance, unctuous to the touch, soluble in both water and alcohol. It consists chemically of two molecules of formaldehyde. It is this substance which is supposed to compose the commercial solutions of formaldehyde, known as formaline, formol, &c.

3. Trioxymethylene, formed by the union of three molecules of formaldehyde. It is a white powder giving off a strong odour of the gas. It is but slightly soluble in alcohol and water.

Formaldehyde gas possesses about the same specific gravity as air, which renders it poorly diffusible, although better than sulphur dioxide, and consequently it penetrates more readily to all portions and corners of a room. Formaldehyde combines with nitrogenous organic matter to form new compounds. A few drops of formaldehyde added to white of an egg will prevent its coagulating by heat, and it is from this faculty of combining directly with albuminoids forming the protoplasm of the micro-organisms that the gas is supposed to derive its powers as a germicide. Formaldehyde also readily unites with the nitrogenous products of decay, fermentation, and decomposition, forming new chemical compounds, which are both odourless and sterile. The commercial solutions known as formaline, formol, &c., are said to contain 40 per cent. of formaldehyde gas. They are not always up to the standard, and being volatile, there is a certain loss if they are not properly kept. In winter there is a decided deterioration owing to the polymerization and precipitation of the insoluble trioxymethylene, the gas probably existing in solution in one of its polymeric states. Formaline is probably dissolved paraformaldehyde. This is one of the reasons why the simple heating or evaporating of the solution does not always result in driving off the gas, but sometimes results merely in dissipating the water, leaving a residue of solid paraform. Trillat has shown, however, that this polymerization is prevented if the solution is heated under pressure.

A.—GASEOUS DISINFECTION WITH FORMALDEHYDE.

Temperature, as with disinfectants in general, is an important factor in disinfecting with formaldehyde. Disinfection with this gas should not be attempted if the temperature is

under 10° C., as the gas tends to condense at lower temperatures to paraform. In cold weather it is recommended that the room to be disinfected should be heated by artificial means, high degrees of heat aiding the disinfectant powers of the gas. A certain amount of moisture has also been found to be essential to successful gaseous disinfection, and the maximum disinfecting power is got only if the atmosphere is saturated with moisture. H. W. Hill states that an amount of gas which failed to kill in 6 hours at 42 per cent. humidity, killed in 20 to 40 minutes at 100 per cent. Another important requirement is that the gas be evolved rapidly, so as to obtain a sufficient concentration of the gas in the room at one time. Rideal, in his experiments with Thursfield's lamp, found that a larger amount of the disinfectant rapidly evolved is of greater value than prolonged exposure to a less quantity of the gas.

Many methods have been given as the most reliable for fumigation with formaldehyde gas. For this investigation two methods were chosen, viz. : —

1. Lingner's apparatus, as representing the method of gaseous disinfection with the atmosphere saturated with moisture.

2. The "Alformant" Lamp, where the method is dependent on the natural humidity of the atmosphere at the time of the experiment.

1. Lingner's Disinfecting Apparatus.

This apparatus, which is made in Germany, consists of a ring boiler in which steam is generated and driven into a reservoir filled with formaline or glyco-formol (30 per cent. formaldehyde with 10 per cent. glycerine). By the pressure of the steam the formaline is ejected in the form of a fine and very abundant spray through four separate nozzles out of the reservoir. Two litres of glyco-formol are recommended to be used for a room 2,800 cubic feet capacity. The addition of glycerine is supposed (1) to hinder polymerization, (2) to hinder evaporation of the formaline after deposition in the room, (3) to thicken the solution and favour its adhesion to a smooth surface and its absorption by pores, in consequence of which its effect is believed to be enhanced. The addition of glycerine has since been found to be unnecessary, the employment of the 40 per cent. formaldehyde solution being quite as efficacious.

Koch, in 1898, in a series of comparative experiments with different methods of gaseous disinfection, concluded that the Lingner method was superior to the other methods of gaseous disinfection. He found that after 1½ hours' exposure Anthrax Bacilli and Staphylococcus Pyogenes were killed ; that faeces exposed on a shelf was negative on re-inoculation, but that faeces in the pocket of a coat gave positive results. These satisfactory results, coming, as they did, when plague was prevalent, led many sanitary authorities on the continent, especially in Russia, to adopt it as a means of disinfecting plague-infected houses.

In this country, Lingner's apparatus is not yet well known, and few scientific tests have been made of its efficiency. Accordingly, attracted by the continental reports of its value, Professor Hay procured, three years ago, the apparatus for use in the work of the Public Health department of the City, and the immediate incitement to the present inquiry was his desire to have the apparatus tested under conditions that would reproduce, as nearly as possible, those under which the work of disinfection of a room and its contents have to be carried out in actual practice in Aberdeen. The following series of experiments with the apparatus were designed to ascertain not only (1) its power as a disinfector, and (2) its powers of penetration, but also (3) to test how far these good results were obtainable where no special precautions were taken to seal up every aperture in a room, further than roughly stopping up the chimney, as often happens in ordinary fumigation.

Experiment 1.

The first experiment was carried out in an old working-class dwelling, forming part of a three-storey tenement in the heart of the City, and consisting of one principal room, with two small rooms or sleeping closets opening off it. The large room measured 18 ft. by 11 ft. by 8 ft., and had an open fire-place and two windows, both windows being loose in their frames. Two panes of glass had been broken, and were roughly covered with paper tacked on to the frames. The entrance door

of the room fitted very loosely, there being a considerable space between the foot of the door and the floor. The two smaller rooms measured 9 ft. by 7 ft. by 8 ft., and 8 ft. by 7 ft. by 8 ft. respectively, and had each one small window but no fireplace. The total cubic space of the main room and the two closets amounted to 2,536 cubic feet.

The object aimed at was the disinfection of the whole dwelling, the apparatus being set agoing in the middle of the floor of the main room, with the doors leading to the small rooms open. During the experiment the four windows and the door were closed in the usual way, without sealing, but the chimney was roughly stopped with paper.

Technique.—Small blocks of unvarnished wood, each 4 in. long by 1½ in. broad, and having a small oblong area marked on the surface, were sterilized in an autoclave at a temperature of 120° C. for 1 hour.

The following micro-organisms were used in the experiment:—

1. An actively sporing culture of Anthrax.
2. 24 hours' culture on Agar of Staphylococcus Pyogenes Aureus.
3. 24 hours' culture on Agar of Bacillus Coli Communis.
4. 24 hours' culture on Agar of Bacillus Typhosus.
5. 24 hours' culture on serum of Bacillus Diphtheriae.

Emulsions of these different micro-organisms were made with bouillon in sterile test glasses, and spread, by means of sterile brushes, on the marked areas of the wooden blocks, and allowed to dry in air. They were then distributed in the following places:—

1. Floor of the main room.
2. The mantelshelf above fireplace of main room.
3. Ledge above window of main room.
4. Shelf, 7 feet from floor, directly opposite the apparatus.
5. Floor of one of the closets, in a corner remote from the door.

In this experiment the blocks were protected from direct deposition of the disinfectant by means of several loosely placed layers of brown paper, and were exposed to the action of the vapours from the apparatus for 3 hours. The marked areas on the wooden blocks were then scraped by means of sterile chips of glass, and the scrapings were placed in tubes of bouillon, and allowed to incubate for 7 days at a temperature of 37° C. Control blocks made at the time of doing the experiment were treated in a similar way, except that they were not exposed to the vapours.

Within 24 hours a copious growth had taken place in the tubes prepared from the control blocks. On the other hand, all the tubes containing the material which had been exposed to Lingner's apparatus remained sterile even after 7 days.

Experiment 2.

The second experiment was carried out in a small ward of the City Hospital, Aberdeen. It had 3 close-fitting two-sashed windows and a stove, the outlet of which was closed by stuffing with paper. The only other precaution taken was to suspend a wet sheet outside the door to assist in p eventing any fumes reaching the patents in the adjoining wards. The size of the room was 16 ft. by 17 ft. by 10 ft., giving a cubic capacity of 2,720 cubic feet, or just 80 feet under the maximum allowed by Lingner for the adequate action of the apparatus. The apparatus was placed in the middle of the floor.

Technique.—Small pieces of glass, 1 in. long by ½ in. broad, were sterilized in the autoclave. The following micro-organisms were used:—

1. Actively sporing culture of Anthrax.
2. 24 hours' Agar culture of Staphylococcus Pyogenes Aureus.
3. 24 hours' Agar culture of Bacillus Coli Communis.
4. 24 hours' Agar culture of Bacillus Typhosus.
5. Sputum containing the tubercle Bacillus in large numbers.

The cultures were made into emulsion with bouillon, and spread on the sterile glass slips. The sputum was spread on an uncovered Petri's capsule. All were allowed to dry in air. They were

then exposed in the following manner for 3 hours to the action of the vapours from the Lingner apparatus :—

1. One set of the 4 cultivations and one specimen of the sputum were placed on the floor, and protected from direct deposition of the vapour by several loose layers of paper.

2. One set of the cultivations alone was set on the mantelshelf above the stove.

3. One set of cultivations and one of sputum were placed between two blankets—that is, having the thickness of two blankets above and two below.

4. One set of cultivations and one of sputum were placed in the centre of a thick mattress, which had been opened up for the purpose and re-closed.

Control experiments were at the same time carried out.

After 3 hours' exposure, the slips of glass were transferred direct into bouillon tubes, without any intermediary process, and incubated at 37° C. Within 24 hours, growth occurred in all the control tubes, as also in all the tubes from the 4th set ; while the tubes from the 1st, 2nd, and 3rd sets remained sterile after 10 days' incubation. The sputum, from exposures Nos. 1 and 3, were each mixed up with a small quantity of bouillon and inoculated into guinea-pigs—the sputum from No. 4 being rejected owing to the negative results from the cultivations similarly exposed. After an interval of 10 weeks, both guinea-pigs were killed, and in neither case was there the faintest trace of a tubercular lesion.

Conclusions.—From these experiments, conducted as they were under conditions which severely tested the powers of the apparatus, it will be seen that Lingner's disinfecting apparatus gives trustworthy results in the disinfection of dwelling-rooms, and, as shown by result of sets 3 and 4 in last experiment, the penetrating power of the disengaged vapour, although not sufficient for mattresses or other thick goods, is apparently quite effective for lighter articles of bedding and clothing.

In the working of the apparatus, I found it advantageous, in order to obtain an immediate and full effect, to begin with very hot water in the boiler. It is also essential to see that all the four jets are working freely.

2. The "Alformant Lamp."

The Alformant Lamp had also been used for some years in the Public Health Department of the City, its use being confined to certain cases where its convenience was an inducement. It was, therefore, suggested by Professor Hay that I should also test its efficiency, the more as its makers ascribed to it a high disinfecting power, and the lamp was widely advertised and used.

This method of evolving formaldehyde gas consists in the heating of paraform, one of the polymeric forms of formaldehyde, which first melts and then breaks up into the two molecules of formaldehyde gas. The lamp is cheap and light, and of very simple construction, consisting of a receptacle or basin for holding the paraform, or, as they are commonly called, the "formaline tablets," with a small methylated spirit lamp beneath. The disadvantages of the method are that the gas is given off without moisture, and tends to polymerize readily, especially on cool, dry days. The gas is also given off rather slowly, and with little force, so that it permeates slowly to all the crevices and corners of a room. The room to be disinfected must have all cracks and crevices carefully sealed up.

Dr. Kenwood, in a paper read at Leeds, in 1897, stated that he had succeeded, by means of the lamp, in sterilizing swabs infected with B. Diphtheriae, using 21 tabloids in a room of 2,004 cubic feet, with a four hours' exposure. More recent experiments, under varied conditions, seem to have given very mixed results, and Kenwood now advocates using 25 tablets per 1,000 cubic feet, if disinfection is to be ensured. Allan, in 1898, in a series of comparative experiments with sulphur dioxide and formaldehyde, conducted in two ordinary dwelling-rooms, used 10 tablets for each 1,000 cubic feet, as recommended by the makers, and got satisfactory results. He found (1) that it was not so much a question of time as of initial volume of gas liberated, and suggested using a large number of lamps rather than a large number of tablets in one lamp ; (2) that the gas had no great power of penetration ; and (3) that the generating apparatus should be as near to the floor as possible.

The following experiment was conducted with the view of comparing the Alformant Lamp method with the Lingner method. In order that the comparison might be as fair as possible, the house used in Experiment 1 was employed, and the same conditions were adhered to, viz., merely stopping up the chimney. In order that the initial volume of the gas should be as large as possible, I used 2 lamps, with 30 tablets in each, giving approximately 24 tablets per 1,000 cubic feet. The relative humidity of the air before starting was 86 per cent.; the inside temperature was 56° F. The organisms used in this experiment were (1) actively sporing Anthrax, (2) 24 hours' culture on Agar of Staphylococcus Pyogenes Aureus, (3) Typhoid Bacilli, and (4) Bacilli Coli Communis.

Technique.—Small pieces of glass, 1 in. long by ½ in. broad, were sterilized in the hot air chamber. Emulsions of the different culture were made in sterile test glasses, and thereafter spread on the slips of glass with a sterile öse, and allowed to dry in air. Control slips were made, and also allowed to dry in air, and then put inside a sterile Petri dish, and kept for the same time as those exposed to the disinfector. The other slips were distributed in the house as in Experiment 1, viz.:—(1) On floor behind the main door, (2) upon the shelf, 7 feet from the floor, near to the lamp, (3) upon the mantelshelf above fireplace, (4) upon the ledge above the window, and (5) on the floor of one of the smaller rooms, in a corner remote from the door. They were then exposed to the action of the Alformant lamps for 3½ hours. The room, on being opened at the end of the time, had a powerful odour of formaldehyde gas. The different slips were then placed direct into bouillon tubes and incubated for 7 days at 37° C., the control slips being at the same time placed in bouillon tubes. Within 24 hours a copious growth was present in all the control tubes. At the end of 7 days, the following results were observed in the tubes containing the exposed slips:—

In the 1st set (floor of main room) growths were observed in the Anthrax, Staphylococcus, and B Coli tubes, while the B. Typhosus tube remained negative.

In the 2nd set (shelf near to lamps) negative results were obtained in all the tubes.

In the 3rd set (mantelshelf above fireplace) growths were obtained in the Anthrax and Staphylococcus tubes, while both B. Coli and Typhosus tubes remained negative.

In the 4th set (above window) growths were obtained in all the four tubes.

In the 5th set (floor of smaller room) growths were obtained in all the four tubes.

Conclusion.—This experiment shows that, where the gas is present in sufficient quantity, as in the 2nd set of organisms, disinfection will be obtained; but it cannot generally be relied upon in ordinary conditions, even where the proportion of paraform used, as in the foregoing experiment, is considerably above that recommended by the makers of the lamp. It also shows that B. Typhosus is the most susceptible of the exposed germs to the action of the gas, three out of the five samples of the cultures of this bacillus being sterilized.

Of course, these indifferent results were obtained with a room which was by no means hermetically sealed, but it was in the same condition as when the corresponding test was made with Lingner's apparatus; and it is well not to rely on any very careful sealing of rooms in the large number of fumigations which have to be carried through by sanitary officers in times of heavy epidemics. The better results of some other observers were no doubt largely due to the more careful sealing of the rooms, but such a sealing as would in general practice not be attained.

On the basis of my experiments, the Lingner apparatus is for ordinary disinfecting work unquestionably superior to the Alformant lamp.

It ought to be added that, although the Alformant lamp is cheap, costing only a few shillings, the paraform tablets are much more expensive than a corresponding amount of formaldehyde in solution.

B.—LIQUID DISINFECTION BY FORMALINE AND OTHER DISINFECTANTS.

Formaline is a 40 per cent. solution of the aldehyde in water, and, as met with in commerce, is a liquid of a pale, sea-green tint, with a specific gravity of about 1,070, and an acid reaction which is due to formic and acetic acids. In more concentrated solutions, the formaldehyde tends to pass into the polymeric and comparatively inactive form. This, therefore, is the strongest solution which will remain permanent. When exposed to the air the formaldehyde vapour is gradually dissipated and the solution loses strength. Loew and Fischer, in 1886, were the first to state

that formaline possessed powerful antiseptic properties. Trillat showed that the presence of a minute quantity of this substance in urine preserved it from putrefying. Buchner, Aronson, Blum, Cohn, and others have investigated the disinfectant properties of formaldehyde in solution. All are agreed in attributing to it powerful antiseptic and deodorant properties. Blum pointed out that micro-organisms are killed in somewhat strong solution only. Slater and Rideal found that a 1 per cent. solution of formaldehyde is sufficient to kill Staphylococcus Pyogenes Aureus in from 50 to 60 minutes, B. Typhosus in from 40 to 50 minutes, B. Coli in from 30 to 40 minutes, B. Anthracis and Vibrio Cholerae in less than 15 minutes, while solutions varying in strength from 1 in 5,000 to 1 in 20,000 were sufficient to inhibit the growth of most organisms. Trétrop considered a 2 per cent. solution of formaline to be a most efficient antiseptic, and stated that he obtained positive results with it after other preparations had failed. Bird speaks highly of formaline as a disinfectant and antiseptic, but finds that the vapour is more powerful as a disinfectant than the solution. Schepilewsky confirmed the experiments of Bird. Kenwood suggests the use of a 2·5 per cent. solution for spraying. Leslie Mackenzie and Alexander speak of the effectiveness of a ·5 per cent. solution for general disinfecting purposes. Park and Guerard find that a 3 per cent. solution will kill Anthrax Spores in 15 minutes, while a 1 per cent. solution will kill all other germs in one hour, and most germs within 30 minutes.

Hill and Abram, in their experiments on the disinfection of excreta, found that faeces when mixed with a 1 in 20 solution of formaline remained sterile on subsequent inoculation. Houston found that formaline in a dilution of 1 in 100 did not prevent the growth of B. Coli after one hour's contact, while in a dilution of 1 in 20 it killed that organism. Thresh and Sowden have made a series of experiments to ascertain the strength of solution necessary to ensure sterilisation. Cultures of B. Diphtheriae, B. Typhosus, B. Pyocyaneus, V. Cholerae, M. Prodigiosus, and Staph. Pyogenes Aureus were spread on wood, on white-washed surfaces, and on wall paper. The infected surfaces were sprayed with solutions of formaline varying in strength from ·5 to 2 per cent. After three to four hours' exposure, the sterility of the sprayed surfaces was tested by means of sub-cultivations, with the following results :—The ·5 solution killed all the organisms on wood and wall paper, but failed to destroy the Bac. Pyocyaneus on white-washed surfaces. The 1 per cent. solution gave similar reactions, but the two per cent. solution sterilised all surfaces.

Muir and Ritchie found that to disinfect an organic mixture containing Pyogenic organisms, a 10 per cent. solution, acting for half an hour, is necessary, and that in the case of pure cultures, a 5 per cent. solution would kill the V. Cholerae in 3 minutes, Anthrax Bacilli in 15 minutes, and Anthrax Spores in 5 hours. When such organisms infect clothing, an exposure to a 40 per cent. solution of formalin for 2 hours, and in case of Anthrax Spores, an exposure for 24 hours, is necessary. Silk threads impregnated with B. Pestis were found to be sterile after 2 minutes' exposure. Nils Englund recommended spraying rooms with a 2 per cent. solution, afterwards closing the room for 24 hours. Walter found that a solution of 1-10,000 arrested the growth of B. Anthracis, V. Cholerae, B. Typhosus, Staphylococcus Pyogenes, and B. Diphtheriae, and that slightly stronger solutions sufficed to destroy these organisms. Faeces were rendered sterile by a 10 per cent. solution in 10 minutes.

The lack of uniformity of result in the various methods of testing the germicidal power of antiseptics and disinfectants has long suggested the necessity for the introduction of some standard method. It must, of course, be conceded that the subject does not lend itself to the exact treatment of chemical analysis. With a testing material consisting of living germs, always liable to variations of vitality and degrees of resistance, *absolute* results are impossible, but, nevertheless, a degree of accuracy may be attained sufficient to render the results of great comparative value. It is evident at any rate that isolated observations upon single antiseptics and disinfectants are of little value ; it is only by comparison of the germicidal action of the various disinfectants under similar conditions that one can arrive at correct conclusions. With this object in view, Ainslie Walker has proposed a means whereby a properly systematized method of estimating the bactericidal value of disinfectants may be established. He suggests that some well-known disinfectant be selected as a standard—one known to give regular and consistent results—such as pure phenol (carbolic acid). Briefly summarised the technique of his method is as follows :—To 5 c.c. of a 24 hours'

blood-heat culture in broth of the organism add 5 c c. of the dilute disinfectant. Shake, and take sub-cultures at definite intervals in suitable media. Incubate for at least 2 days at 37° C. If an Agar culture be preferred, take up part of the growth on the point of a platinum needle, and distribute it evenly in sterilized water ; the resulting emulsion may be used in place of the broth culture, the rest of the procedure in both cases being identical. A similar experiment is carried out simultaneously with a dilute solution of phenol. From the results thus obtained, the strength or efficiency of the disinfectant is expressed in multiples of the volume of carbolic acid performing the same work ; or this multiple may be expressed as the "Carbolic Acid Co-efficient." For example:—

B. COLI COMMUNIS—24 Hours' Broth Culture.

Disinfectant.	Dilution.	Thin Cultures Exposed to Disinfectant (in Minutes).						Period of Incubation.	Temperature.
		2½	5	7½	10	12½	15		
X . .	1—1,000 . .	+	+	—	—	—	—	48 hours	37° C.
Phenol .	1—100 . .	+	+	—	—	—	—	48 hours	37° C.

(+ = Growth ; — = No Growth.)

The multiple here is 10—*i.e.*, it will require 10 volumes of carbolic acid to perform the work done by one volume of the disinfectant (x) under observation.

The following experiments were undertaken to test and compare the relative actions of Formaline, Phenol, Corrosive Sublimate, Cyllin, Izal, and Sanitas.

Phenol.—Carbolic acid, once the most widely used of disinfectants, has been much disparaged in recent years because laboratory tests have demonstrated that it cannot be depended upon to kill Spores. A 1 or 2 per cent. solution has no certain effect upon Anthrax Spores. A 3 per cent. solution requires 7 days, a 4 per cent. solution, 3 days, and a 5 per cent. solution, 2 days to kill Anthrax Spores. Weaker solutions are effective for non-sporing bacteria. Behring found that ½ per cent. solution killed the germs of cholera, plague, typhoid, diphtheria, and erysipelas in one hour, while a 1 to 1½ per cent. solution would destroy these organisms in one minute.

Corrosive Sublimate.—The high disinfectant powers of perchloride of mercury are well known. It is largely used in surgery, but is little used, at any rate in this country, for ordinary disinfection. One important objection to its use being its great poisonousness. A solution of 1 in 1,000 is ample for the destruction of non-sporing bacteria in half-an-hour. Solutions of 1-500 and 1 800 will kill non-sporing bacteria in a short time. For Spores, 1-500 solution, with an exposure for one hour, is necessary. Andrewes has pointed out that the resistance of the Staphylococcus Pyogenes Aureus against mercurial salts is altogether exceptional, but that this resistance does not extend to antiseptics of other groups, such as carbolic acid, &c. He found that suspensions of the Staphylococcus Pyogenes in sterile water were destroyed by a 1-500 solution of corrosive sublimate in 12½ minutes, and by a 1-1,000 solution in 50 minutes, while beef-tea cultures of the organism required for their destruction with similar dilutions of the disinfectant, 45 minutes and 4 hours respectively. These results illustrate remarkably well a point upon which Andrewes has laid great stress—the fact, namely, that the presence of organic matter exercises a distinctly retarding influence on the germicidal action of corrosive sublimate.

Cyllin is the new name for creolin, as manufactured by Jeyes' Disinfectant Co. Its composition, however, is not quite identical with the fluid sold until recently as Creolin, but has been modified with a view to obtain the highest germicidal value with the lowest possible toxicity to higher animals. It is stated to contain no carbolic acid or its homologues, and to rely solely for its high efficiency on certain members of another chemical series which have been recently isolated. It forms a pinkish emulsion when mixed with water.

Klein, in a series of experiments, completed after my own investigation had been largely carried out, compared the action of cyllin, formaline, and carbolic acid on B. Pestis, and found that a solution of 1-30 formaline did not kill B. Pestis. On the other hand, a solution of 1-80 carbolic acid killed B. Pestis after 10 minutes' exposure, and a solution of 1-2,400 cyllin killed B. Pestis after 10 minutes. Klein concludes, from these experiments, that the germicidal power of a 1-2,400 solution of cyllin is equal to that of a 1-80 solution of phenol, and greater than a 1-30 solution of formaline. Therefore, the disinfecting power of cyllin is about 30 times as great as that of phenol, and more than 80 times that of formaline. These results are certainly very striking. It ought, however, to be mentioned that the experiments were apparently undertaken at the instance of the makers of cyllin. How far my own experiments agree with these will be seen later. They were undertaken without any communication with the makers, and the cyllin used was purchased in the ordinary way.

The following was the procedure in the first series of the experiments made by myself. (Izal and sanitas were not included in this series) :—

(1) The germs taken were cultures of Staphylococcus Pyogenes Aureus, Bac. Typhosus, and sporing Anthrax, and they were grown in bouillon, each tube containing exactly 10 c.c. bouillon. The first two cultures were of 24 hours' growth, and the latter of 7 days'.

(2) To each of these tubes enough of each disinfectant was added to give the different strengths of solution of disinfectant determined upon. The tubes were then thoroughly shaken.

(3) At every 2½ minutes, up to 15 minutes, 7 öse loopfuls of the mixture were re-inoculated into fresh tubes of bouillon and incubated at 37° C. for 8 days.

The cultures used had been recently isolated, the Staphylococcus being isolated from an acute abscess, the Bac. Typhosus from a recently fatal case of Typhoid Fever, and the Anthrax from a recent case, and in an actively sporing condition. The formaline was tested just before commencing the experiment, and was found to contain 32 per cent. of formaldehyde gas, so that the different dilutions given must be calculated upon that basis and not the ordinary one of 40 per cent. The various dilutions of the disinfectants employed were such as are in common use for disinfectant purposes.

The following results were obtained :—

FORMALINE (Strength 32 %).

Organism.	Dilution of Disinfectant.	Time of Exposure (in Minutes).						Period of Incubation.	Temperature.
		2½	5	7½	10	12½	15		
Anthrax Spores	1—30	+	+	+	+	+	+	8 days	37° C.
	1—50	+	+	+	+	+	+		
	1—100	+	+	+	+	+	+		
B. Typhosus	1—30	+	+	+	+	—	—	8 days	37° C.
	1—50	+	+	+	+	+	+		
	1—100	+	+	+	+	+	+		
Staph. Pyog. Aureus	1—30	+	+	+	+	+	+	8 days	37° C.
	1—50	+	+	+	+	+	+		
	1—100	+	+	+	+	+	+		

(+ = Growth ; — = No Growth.)

Growth was present in all the tubes with the exception of B. Typhosus in solution of 1—30 at 12½ and 15 minutes exposure.

PHENOL.

Organism.	Dilution of Disinfectant.	Time of Exposure (in Minutes).					
		2½	5	7½	10	12½	15
Anthrax Spores	1—20	+	+	+	+	+	+
	1—40	+	+	+	+	+	+
	1—80	+	+	+	+	+	+
B. Typhosus	1—20	+	+	+	—	—	—
	1—40	+	+	+	+	—	—
	1—80	+	+	+	+	+	—
Staph. Pyog. Aureus	1—20	+	+	+	+	+	+
	1—40	+	+	+	+	+	+
	1—80	+	+	+	+	+	+

(+ = Growth; — = No Growth.)

Growth was present in all the tubes of Anthrax Spores and Staphylococcus Pyogenes.

B. Typhosus killed in 10 minutes by 1 in 20 solution, in 12½ minutes by 1 in 40 solution, and in 15 minutes by 1 in 80 solution of Phenol.

CORROSIVE SUBLIMATE.

Organism.	Dilution of Disinfectant.	Time of Exposure (in Minutes).					
		2½	5	7½	10	12½	15
Anthrax Spores	1- 1,000	+	+	+	+	+	+
	1—2,000	+	+	+	+	+	+
	1—5,000	+	+	+	+	+	+
B. Typhosus	1—1,000	+	—	—	—	—	—
	1—2,000	+	+	+	+	—	—
	1—5,000	+	+	+	+	+	+
Staph. Pyog. Aureus	1—1,000	+	+	+	+	+	+
	1—2,000	+	+	+	+	+	+
	1—5,000	+	+	+	+	+	+

(+ = Growth; — = No Growth.)

Growth was present in all tubes of Anthrax Spores and Staphylococcus Aureus.

B. Typhosus was killed in 5 minutes by 1—1,000, and in 12½ minutes by 1—2,000.

CYLLIN.

Organism.	Dilution of Disinfectant.	Time of Exposure (in Minutes).					
		2½	5	7½	10	12½	15
Anthrax Spores	1—1,000	+	+	+	+	+	+
	1—2,000	+	+	+	+	+	+
	1—2,500	+	+	+	+	+	+
B. Typhosus	1—1,000	+	+	+	+	+	+
	1—2,000	+	+	+	+	+	+
	1—2,500	+	+	+	+	+	+
Staph. Pyog. Aureus	1—1,000	+	+	+	+	+	+
	1—2,000	+	+	+	+	+	+
	1—2,500	+	+	+	+	+	+

(+ = Growth; — = No Growth.)

Growth was present in all the tubes.

In my second series of experiments, the procedure adopted by Klein in his experiments on B. Pestis was followed. The same organisms were used as in my first series of experiments. The dilutions of the disinfectants used in this series of experiments were the same as those employed by Klein in certain of his more crucial experiments. They were the same for formaline and phenol, as in my first series, but the dilutions of cyllin and corrosive sublimate were about twice the strength of those used in the first series. Agar cultures were used instead of bouillon cultures.

1. Emulsions of the different cultures were made in sterile distilled water, using one öse loopful of the culture in each case.

2. 5 c.c. of the different strengths of the disinfectant were put into sterile tubes.

3. To each tube of disinfectant was added ·1 c.c. of the emulsion of the organism, and the mixture was then shaken thoroughly.

4. At end of intervals of 5, 10, and 15 minutes, 3 öse loopfuls of the mixture were smeared over the surface of an Agar tube, and incubated for 8 days at 37° C. The following results were obtained :—

FORMALINE (32 %).

Organism.	Dilution of Disinfectant.	Time of Exposure (in Minutes).		
		5	10	15
Anthrax Spores	1—30	+	+	+
	1—50	+	+	+
	1—100	+	+	+
B. Typhosus	1—30	+	+	1 single colony.
	1—50	+	+	a few colonies.
	1—100	+	+	+
Staph. Pyog. Aureus	1—30	+	+	3 colonies.
	1—50	+	+	+
	1—100	+	+	+

(+ = Growth ; — = No Growth.)

Growth was present in all tubes, although in case of B. Typhosus, 1—30 solution, only a single colony developed.

PHENOL.

Organism	Dilution of Disinfectant.	Time of Exposure (in Minutes).		
		5	10	15
Anthrax Spores	1—20	+	+	+
	1—40	+	–	+
	1—80	+	+	+
B. Typhosus	1—20	—	—	—
	1—40	—	—	—
	1—80	+	+	—
Staph. Pyog. Aureus	1—20	—	—	—
	1—40	—	—	—
	1—80	+	+	—

(+ = Growth ; — = No Growth.)

Phenol in these different strengths and exposures had no action on Anthrax Spores. It, however, killed B. Typhosus, with a dilution of 1—80, in 15 minutes, and Staph. Pyog. Aureus, with a dilution of 1—80 in 15 minutes.

CORROSIVE SUBLIMATE.

Organism.	Dilution of Disinfectant.	Time of Exposure (in Minutes).		
		5	10	15
Anthrax	1—500	+	—	—
	1—1,000	+	—	—
	1—1,500	+	+	+
B. Typhosus	1—500	—	—	—
	1—1,000	—	—	—
	1—1,500	+	—	—
Staph. Pyog. Aureus	1—500	+	+	—
	1—1,000	+	+	+
	1—1,500	+	+	+

(+ = Growth ; — = No Growth.)

Growth was absent in dilutions of 1—500, after 10 and 15 minutes' exposure in the case of Anthrax Spores. With B. Typhosus, growth was absent, after 5 minutes' exposure, in all except in the dilution 1—1,500. With Staphylococcus Pyogenes, growth was present, after 15 minutes' exposure, in all tubes except dilution 1—500.

CYLLIN.

Organism.	Dilution of Disinfectant.	Time of Exposure (in Minutes).		
		5	10	15
Anthrax Spores	1—500	+	+	+
	1—1,000	+	+	+
	1—1,500	+	+	+
B. Typhosus	1—500	+	—	—
	1—1,000	+	+	+
	1—1,500	+	+	+
Staph. Pyog. Aureus	1—500	+	—	—
	1—1,000	+	+	+
	1—1,500	+	+	+

(+ = Growth ; — = No Growth.)

Growth was present in all tubes, except those of B. Typhosus and Staph. Pyog. Aureus, where the dilution was 1 in 500, and the exposure was 10 minutes and 15 minutes.

IZAL.

Organism.	Dilution of Disinfectant.	Time of Exposure (in Minutes).		
		5	10	15
Anthrax Spores	Pure	+	—	—
	1—800	+	+	+
	1—900	+	+	+
	1—1,000	+	+	+
B. Typhosus	1—800	—	—	—
	1—900	+	—	—
	1—1,000	+	+	+
Staph. Pyog. Aureus	1—800	—	—	—
	1—900	+	+	—
	1—1,000	+	+	+

(+ = Growth ; — = No Growth.)

Izal, in all of the dilutions tested, failed to destroy Anthrax Spores, though killing them in 10 minutes when applied pure. Against B. Typhosus and Staph. Pyog. Aureus it was effective in dilutions up to 1—900.

SANITAS.

Organism.	Dilution of Disinfectant.	Time of Exposure (in Minutes).		
		5	10	15
Anthrax Spores	Pure . . .	+	+	+
	1—5 . . .	+	+	+
	1—10 . . .	+	+	+
B. Typhosus	Pure . . .	—	—	—
	1—5 . . .	+	+	+
	1—10 . . .	+	+	+
Staph. Pyog. Aureus . . .	Pure . . .	—	—	—
	1—5 . . .	+	+	+
	1—10 . . .	+	+	+

(+ = Growth ; — = No Growth.)

Growth was present in all tubes of Anthrax Spores. It was also present in all tubes of B. Typhosus and Staph. Pyog. Aureus, except the tubes in which the sanitas was applied undiluted.

The conclusions to be drawn from these two series of experiments on liquid disinfection appear to be as follows :—

1. *Formaline.*—In none of the dilutions used—though they are dilutions in common use for disinfectant purposes—and for the exposures tested, was formaline found to be completely efficient as a general disinfectant, though the bacillus of typhoid was evidently affected by it in the stronger dilutions. It was evident that even for non-sporing micro-organisms the strength of formaline solution should not be less than 4 to 5 per cent., and for sporing organisms it ought to be still stronger. It appeared to have only about half the germicidal power of phenol.

2. *Phenol* or *Carbolic Acid*, in practically the same dilutions as formaline, and with the same exposures, acted as a germicide for B. Typhosus and Staphylococcus Pyog. Aureus, but not for the other germs tested. It is, therefore, as already remarked, a more effective disinfectant than formaline, being probably twice as potent.

3. *Cyllin*, in the degrees of dilution with which Klein obtained satisfactory results, and after the same exposures, has not yielded in my hands the same results. At the same time, it is evidently a disinfectant of great power, being effective against non-sporing organisms in dilutions of 1 in 500. My tests would lead me to rank it as about ten times as potent as phenol.

4. *Corrosive Sublimate*, in the same dilutions as cyllin, showed itself to be more powerful than cyllin, especially in attacking the B. Typhosus and Anthrax spores. In its action on Staphylococcus, however, it is less effective than cyllin. This relative lack of efficiency against Staphylococcus is in agreement with the observations of Andrews.

5. *Izal* is another powerful disinfectant, being probably twenty times more active than phenol, and about twice as potent as cyllin. Against some organisms, as anthrax, it is less active than corrosive sublimate, but against staphylococcus pyog. aureus it is more active.

6. *Sanitas* showed itself in these experiments to be by much the least active of the disinfectants tested. Apparently, it can only be relied upon when applied undiluted, and even then it may fail to kill sporing organisms.


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